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Volume V, Number 8 August 1982 $2.50 ($3.00 Canada, £1.75 UK.)

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Apple PugetSound Program Library Exchange

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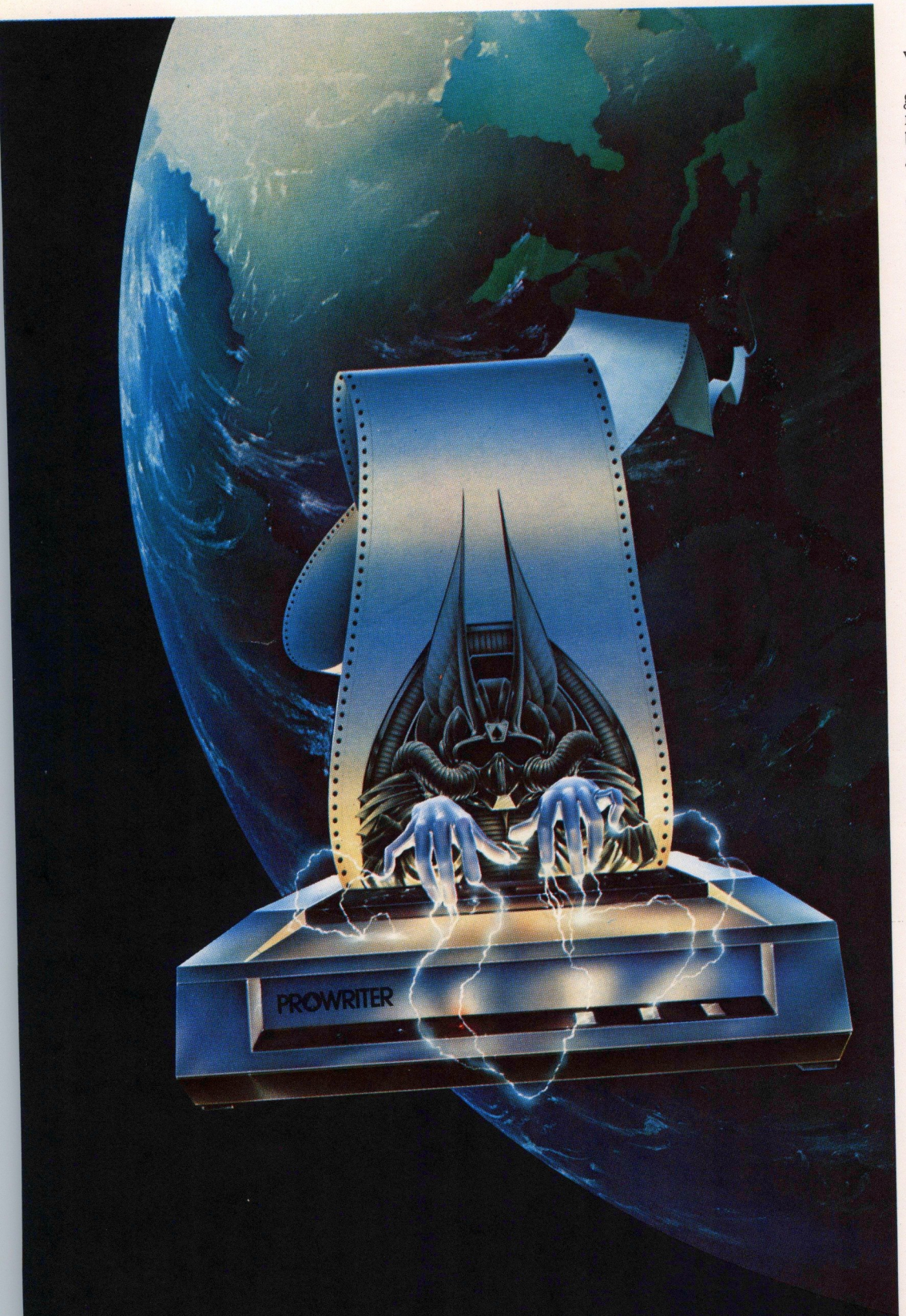

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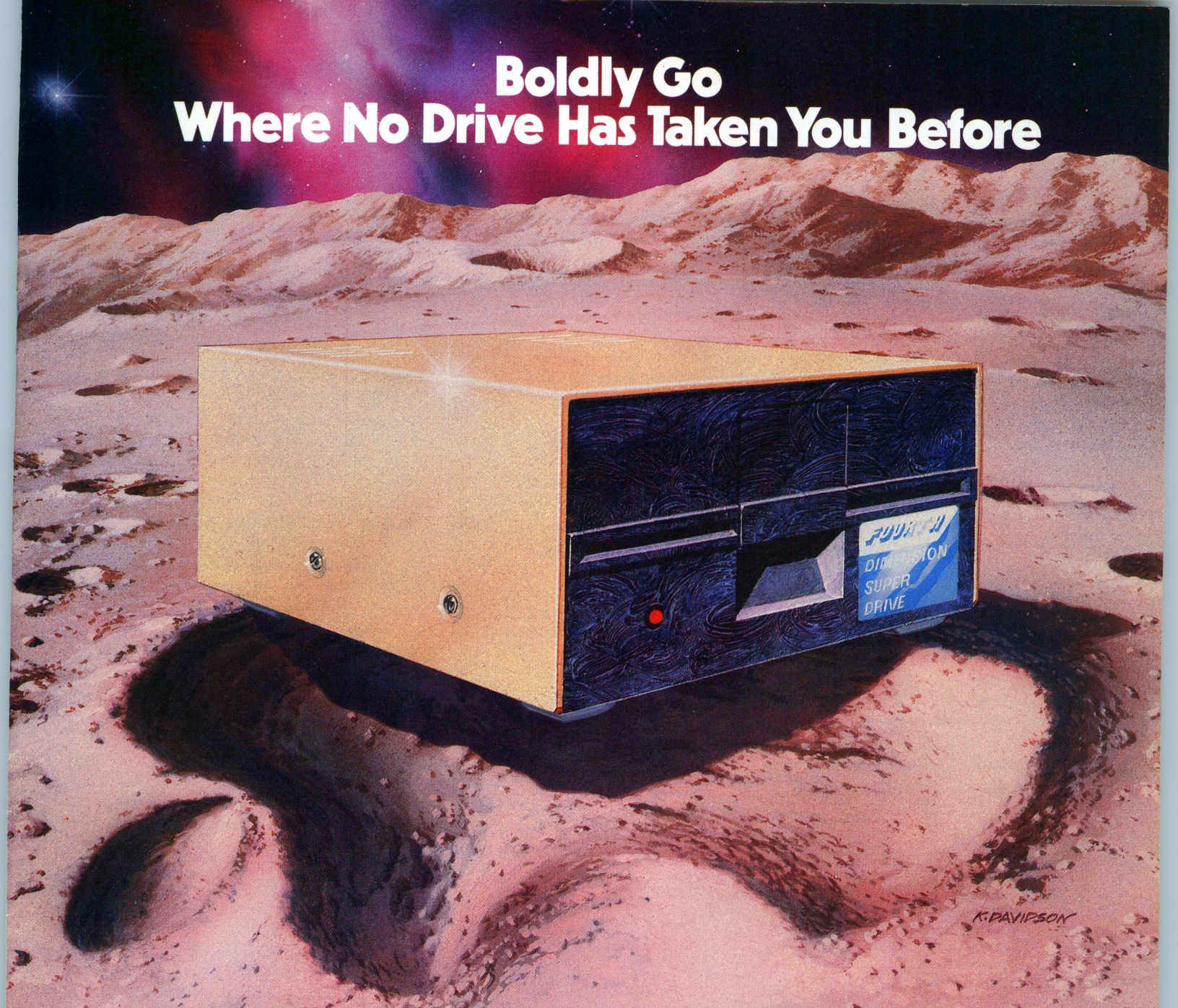

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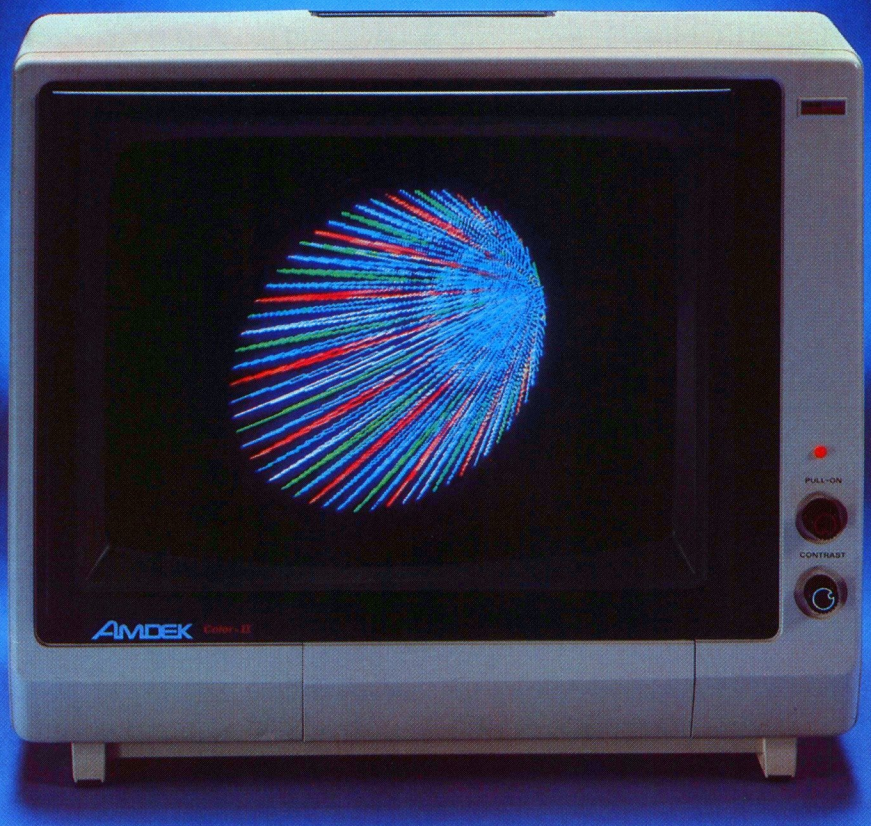
The High-Resolution Color Monitor for Apple II



Amdek's new Color-II monitor with DVM interface board

No video monitor has ever combined Apple II compatibility with exceptional performance like the new 13" Color-II monitor from Amdek.

Color-II features our optional new DVM peripheral board for easy interfacing with your Apple II. And look at the other top-of-the-line features Color-II offers:

- RGB, TTL input for high resolution graphics.
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- 560 (H) x 260 (V) resolution.
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So if you want to get the most from your Apple II system, get the "most" monitor. Ask your dealer about Amdek's new Color-II monitor with the optional DVM interface board.

What is DVM? The DVM, or "Digital Video Multiplexor," is a low cost interface that allows the Apple II computer to be used with an RGB monitor, such as our Color-II.

Amdek's DVM is software programmable to allow transparent operation, and is parallel with existing Apple text and graphic modes. Three of its channels are used to multiplex the existing Apple text, low resolution and high resolution graphics. The 4th channel allows the use of an 80 character line video board.

Our DVM is also color channel software programmable, enabling you to turn the three color channels on or off by software control. For example, the red and blue channel can be turned off when the 80 character channel is turned on, resulting in a green phosphor video presentation.

For convenient operation, the DVM board may occupy any slot in the Apple II. The DVM also features low-power consumption and low-power schottky logic.

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THE EDITOR BYTES BACK

the editor

TOMORROW the world. That's the idea, if somewhat overstated, behind **Tomorrow's Apples Today, Kevin Donohoe's** continuing compilation of some of the newest and unique products coming to Appledom. If you've looked in the other magazines without success, then take a look at Kevin's column. What's more, if you can't find your product there, drop us a line. If an item exists for your particular application, we'll try and find it. If you're not a member of **A.P.P.L.E.,** let us add that this concept, along with our low-priced member software, to the many reasons for joining.

Nationally syndicated columnist **Mike Mailway** has recently formed his own syndication bureau, **Crown Syndicate, Inc.** Since Mike is one of our members, we have been able to make special arrangements to bring you **Craig MacIntosh's Boot,** making its second appearance this month. We hope you enjoy it.

Speaking of this month, let's take a look at our headlines and see what's in store: **Clay Ruth** returns to top the cover with some good technique: **Garbagemen Strike Again,** one more (and different way) to circumvent the frustrations of Applesoft garbage collection.

David Linker (with a name like Linker, he's Icelandic???) offers **Total Recall,** an application program to work in conjunction with **Multiple Disk Catalog** on our Utility Diskpak 6B-16. Dave has found a way to decrease sort times tenfold, which makes this file utility practical to work with for the first time.

As promised, our European consultant and staff writer **Cornelis Bongers** brings you a comprehensive report of his views of the **BASIS 108,** an Apple-compatible computer very recently released. What makes this review particularly intriguing is that the BASIS apparently incorporates most, if not all, of the innovations anticipated in the new revision Apple][to be announced later this year.

Spelling Programs are a Johnny-come-lately in the area of Apple word processing. Staff writer **Ralph Swerdlow** reviews three of the early contenders, and from our mountain-top view, they look like a real assist to writers.

Everybody likes a contest, right? So here's one our members can participate in several ways. If we've caught your interest, hustle off and read **So What Did You Expect... a Call -A.P.P.L.E. Contest?**

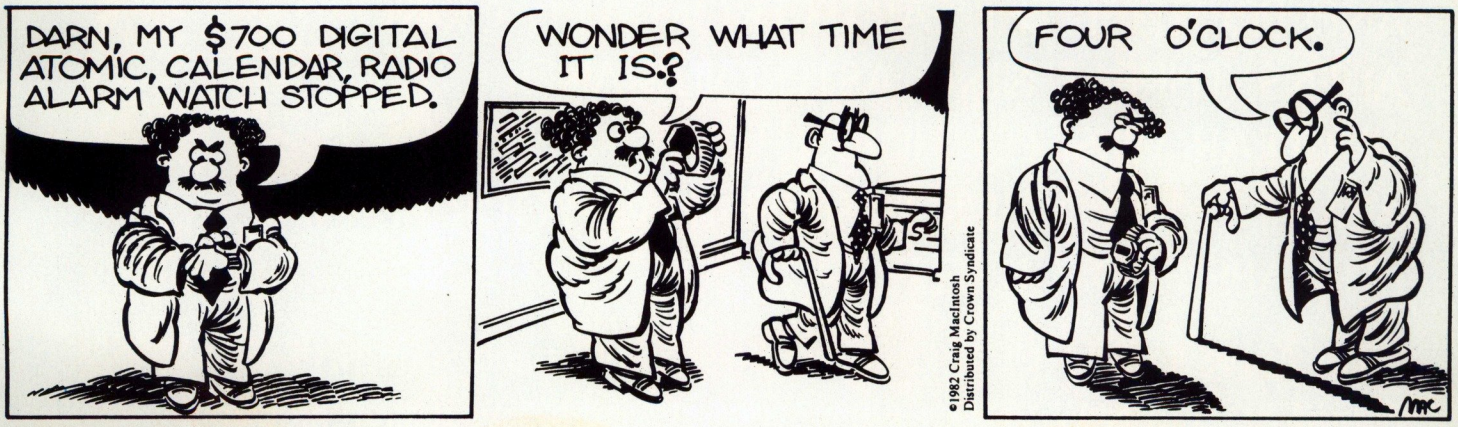
The gospel we teach is, among other things, that there is always a better way. No matter how good the programmer, there are always things that can be overlooked, enhancements, ways to speed up execution, etc. Many of these modifications or improvements originate with our members who understand one of our original and underlying club principles: members help members.

This is one way in which **Call -A.P.P.L.E.** sets itself aside from and above other Apple magazines: we will reprint stories or programs where significant changes have been made that demand republication. In this issue, **David Sparks** roasts some boo-boos made by yours truly in **Roasting Applesoft Preserves, Roy Myers** uncovered a new technique for **Doing the Splits,** by putting the subroutines in lower memory when splitting an Applesoft program around the Hi-Res page, and some nice enhancements can be expected shortly for **Lee Reynolds FILEDUMP,** a highly popular DOS utility that appeared in the June issue.

As usual, we have run out of space long before we could mention even half of the exciting new programs and stories in this issue, thus your recourse is to JMP to the contents page and look over what we didn't describe.

BOOT

Craig MacIntosh



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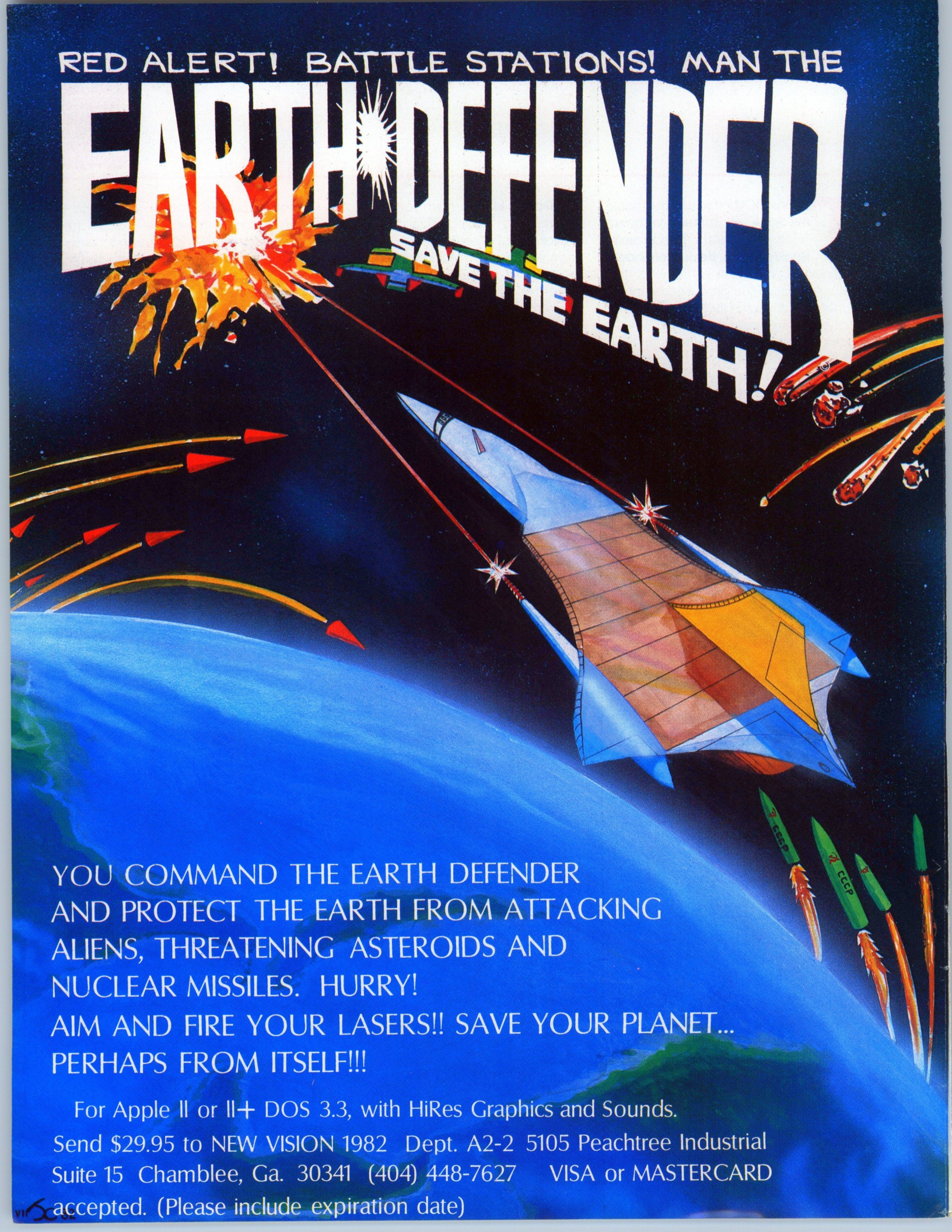
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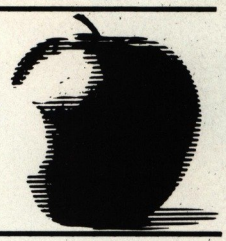

Val J. Golding

DISCOUNTS for our members is the word this time around. By the time you read this, you should have already received our special member's mailing, which is planned to include at least the three items covered in the following paragraphs, and perhaps more. It is here that the element of "time travel" we often write about comes into play. We write in June for the August *Call –A.P.P.L.E.,* about something that when you read it, is already in your past, since you have read, and perhaps already ordered items from the mailer.

In the event you haven't yet, here are some of the schemes we have put together to save money for our members, while at the same time expanding the uses to which they may put their Apple.

For members of A.P.P.L.E.: *Source,* a service by Source Telecommunications, Inc., which provides a wide range of online data bases, electronic mail, shopping services, "chatting" with other members and numerous other features. Our special price to members is $75 to subscribe to this multi-faceted system, a 25% discount off the regular price. In addition we expect to announce shortly the availability of a "closed system" that will be available for the exclusive use of A.P.P.L.E./Source members which is expected to include downloading of *Call –A.P.P.L.E.* programs, programming and technical assistance and other member oriented functions.

Next we have reduced rate subscriptions to two popular Apple magazines, *Softalk* and *Peelings.* Softalk is offered free to Apple Computer users for the first year; thereafter subscriptions are $24. Our special offer to members will let you renew at the bargain basement price of $15 for the next year. Peelings is a magazine devoted entirely to in depth reviews of products, software and hardware, for the Apple computer. We refer to it often, and find it indispensible. We are sure you will also, particularly when we let you know you can save $3 over the regular subscription price of $21.

What more can we do? Ask and ye shall receive. *Power of Visicalc* has been one of the most-ordered items from the A.P.P.L.E. library. Now we have volume 2 of this worthwhile series available at the member price of $8.50. But wait, suppose you have neither volume currently. Once again, your club to the rescue. Now you can order both volumes for a total special price of $13 and save four ($1) bills in the process. Just see the order form on the last page.

Sometimes we just sit here, racking our collective brains to see what we can come up with in the way of new products and specials that would be of benefit to our members. You can help. Drop us a note with suggestions of what *you* would like to see offered. Note this does not mean we will automatically make them available, but your ideas will certainly give us food for thought. All commercial products that we supply to our members are products that have been determined by the A.P.P.L.E. board of directors to be of superior quality and useful to our members.

epple VANTEC 80

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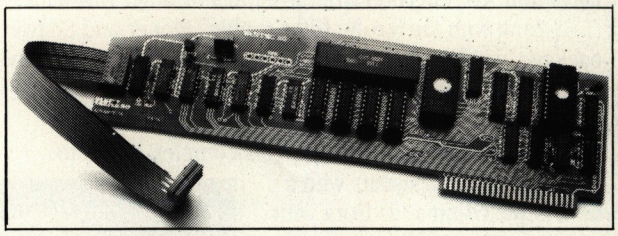

- The VANTEC 80 is the only board that can overlay an 80 character display on the normal Apple video.
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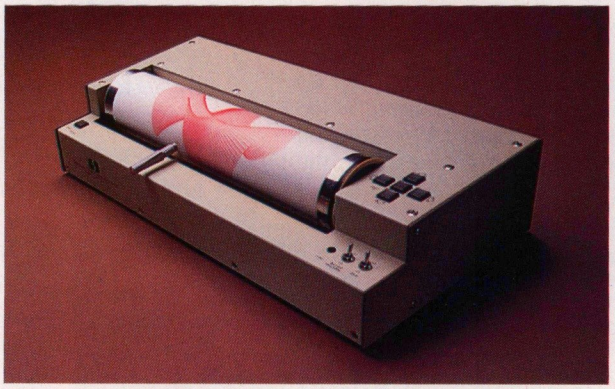

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STROBE INCORPORATED

Strobe Inc.
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The Strobe Graphics System

Seeing is believing

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A Call —A.P.P.L.E. TECHNIQUE:

Garbagemen Strike

SELECTIVE STRING PRESERVATION

Clay Ruth

MOST Applesoft programmers, and many non-programming users, are all too well aware of "garbage collection." That's what happens whenever the strings, which Applesoft stores from HIMEM: downward, run into array variables which build upward from the simple variables atop the tokenized program. The Apple pauses to sift through the strings, packing all the active ones into the upper reaches of RAM (just below DOS) and wiping out those that are no longer pointed to by a string variable.

If there are only a few string variables, this happens very quickly. You may not even notice that anything is wrong. However, once you've DIMensioned a large string array, garbage collection becomes a painful process. You've just entered a string from the keyboard, or one has just been read from a file, or some previous strings are being concatenated by the program, when suddenly the Apple seems to lock up. For a couple of frustrated minutes you bang the keyboard, trying everything you can think of to get the blasted thing going again. Just when you're about to hit the panic buttom (spelled R-E-S-E-T), suddenly everything proceeds as though nothing has happened...and perhaps then you realize for the first time that you've been tricked by the garbageman!

Garbage collection becomes a painful process.

A Need Arose

I recently began marketing a software package I authored for use by radio amateurs who participate in radio contests. My "Contest Radio Operating System" is a complex string-processing program. Call signs of other stations are input from the keyboard and checked against all previously-entered calls to avoid duplication. Those with whom contacts are completed are stored in a 10 by 500 string array. Information exchanged between stations is input from the keyboard and written out to a text file. Transmitted messages are generated automatically for Morse code sending. It handles a lot of lengthy strings on a once-through basis, while all it really needs to retain in the long run is the callsign array! Speed is of the utmost importance, as any unnecessary pauses can cause lost contacts. Garbage collection threatened to be its downfall until I developed a technique I call "Selective String Preservation".

I had considered using "Fast Garbage Collection" *(Call -A.P.P.L.E.,* January, 1981), But it would have added 505 bytes of overhead, and garbage collection would still occur (more quickly, but also more frequently). Besides, I would have to secure permission to use Randy Wiggington's routine in a commercial product. I sought a way to eliminate garbage collection altogether.

I sought a way to eliminate garbage collection altogether.

What It Does

In any string-processing program, the strings can be classified according to two categories:

1. "Permanent" - those strings needed in RAM for later use.
2. "Temporary" - those strings passed once-through to a file or other output device, after which they are no longer needed.

Garbage collection is the process of eliminating temporary strings "en masse" by packing permanent strings together in upper RAM.

Garbage collection is the process of eliminating temporary strings...

Selective string preservation involves continual elimination of temporary strings by allowing each new permanent string to overwrite them. Permanent strings are effectively packed together in upper RAM just as with garbage collection, but the packing is done as the string is generated, not put off until memory is full.

The process itself is extremely simple and requires very little overhead. The tricky part is figuring out exactly where to implement it in your program!

Implementation

Before you attempt selective string preservation, make sure the program has been completely debugged. Using selective preservation routines at the wrong spot in the program will do some *very* strange things to your data! It is helpful to know that only the modifications, not some other bugs, are to blame. Save your unmodified program separately, so you can go back to it if problems with the modifications force you back to Step 1. Here's the procedure:

Save your unmodified program separately...

GARBAGEMEN STRIKE

Step 1:
Add two one-line subroutines to your program, as shown in lines 305 and 306 of Listing 1. You can give them any numbers that are convenient for your program, and they don't have to be together. If your program already uses the variables SL and SH, you can call them something else in these subroutines. You could use SL% and SH% if you like, as they will always be integers.

Step 2:
Here's the difficult part! You must study the flow of logic in your program and find all areas where temporary strings are assigned, processed and disposed of between assignments of permanent strings. Immediately after accepting a permanent string, insert a GOSUB 305. Then, after temporary strings have been processed through, insert GOSUB 306 before the next permanent string is assigned.

Step 3:
Save the modified version, then run it. Process some strings with it, and exit. Then print your permanent strings to confirm their accuracy, and review any resultant files to make sure none of your temporary strings got scrambled before they were written out. If everything looks normal, proceed with Step 4. If not, start over.

Step 4:
Now look for the proof that you've accomplished something! Get into the monitor with CALL -151 and enter 6F.74 [return]. Bytes $6F and $70 (decimal 111 and 112) point to the low end of the strings (low order byte first). Bytes $73 and $74 point to the high end (HIMEM:).

Display a screenful of bytes within the string area. You'll find the ASCII representation of all your permanent strings packed end-to-end below HIMEM:, and only the most recently-entered temporary strings (those not yet overwritten) below them. Compare this to what you see when you run the unmodified version...all the garbage interspersed among your permanent strings. Comparing the low-end pointers ($6F.70) after a long session will show you just how much memory you've saved.

Comparing the low-end pointers. . . will show how much memory you've saved.

An Example

You might want to type in the program shown in Listing 1, just to prove to yourself that it works. Sample runs are included, complete with post-run memory examination.

The example is a simple database generation program which accepts keyboard input and writes it to a sequential text file. Each topic is compared to all previous topics to avoid duplication. To accomplish this, the topics are stored in the PERM$ array, which must be treated as permanent strings. The DOS control string, D$, is also permanent, because we use it every time we access the disk. All other strings (A$ and B$) are temporary because once they are in the file, we never refer to them again.

...permanent strings are stored in the PERM$ array...

Selective string preservation is easiest to implement when you organize your program in this way; that is, all temporary strings involved in one pass through the loop are generated, processed and disposed of between assignments of permanent strings. If your program can't be arranged this way, you may have to settle for some garbage buildup. At least you can minimize it. As a general rule, never execute a GOSUB 306 until the temporary strings have been sent to their final destination.

The complete program in Listing 1 is the "AFTER" program (already modified). To make the "BEFORE" version, delete lines 15, 85, 175, 305 and 306, and change the branch lines as indicated in the REMarks in lines 100 and 170.

```
]LIST
5  REM
Selective String Preservation
  Demo Program  *  Clay Ruth

Call -A.P.P.L.E.  : Aug. 1982

10 D$ =  CHR$ (4)
15  GOSUB 305: REM
INITIALIZE SL, SH TO PRESERVE D$
20  HOME : INPUT "HOW MANY TOPICS
     SHALL WE DISCUSS?";N%
30  IF N% < 1 THEN  END
40  DIM PERM$(N%)
50  PRINT D$;"OPEN TOPICS"
60  PRINT D$;"WRITE TOPICS"
70  PRINT N%: PRINT D$
80  FOR I = 1 TO N%
85  GOSUB 306: REM
PREPARE TO INPUT PERMANENT STRING

90  PRINT :DUPE = 0: INPUT "NAME
    A TOPIC:";PERM$(I)
100  IF  LEN (PERM$(I)) = 0 THEN
     85: REM  USE "...THEN 90" FO
     R THE "BEFORE" VERSION
110  FOR T = 1 TO I
120  IF T = I THEN 170
130  IF PERM$(T) <  > PERM$(I) THEN
     170
140  PRINT : PRINT "WE'VE ALREADY
     DISCUSSED ";PERM$(I);"."
150  PRINT "PLEASE CHOOSE SOMETHI
     NG ELSE."
160 DUPE = 1
170  NEXT T: IF DUPE THEN 85: REM
     USE "...THEN 90" FOR THE "B
     EFORE" VERSION
175  GOSUB 305: REM
RESET SL, SH TO PRESERVE
NEW PERMANENT STRING
180  PRINT : PRINT "DO YOU LIKE "
     ;PERM$(I);
190  INPUT A$: IF  LEN (A$) = 0 THEN
     180
200  IF  LEFT$ (A$,1) <  > "Y" AND
     LEFT$ (A$,1) <  > "N" THEN
     180
210  PRINT : PRINT "WHY";
220  IF  LEFT$ (A$,1) = "N" THEN
     PRINT " NOT";
230  INPUT B$
240  IF  LEN (B$) = 0 THEN 210
250  PRINT : PRINT D$;"WRITE TOPI
     CS"
260  PRINT PERM$(I): PRINT A$: PRINT
     B$: PRINT D$
270  NEXT I
280  PRINT D$,"CLOSE"
290  PRINT : PRINT "THAT'S ALL FO
     R NOW.  THANKS!"
300  END
305 SL =  PEEK (111):SH
     =  PEEK (
     112): RETURN
306  POKE 111,SL:
     POKE 112,SH: RETURN
```

How the program works:

Line 10 defines D$ as CHR$(4) for use in DOS commands. This will remain unaltered and will be used several times during execution; therefore, it is a permanent string.

Line 15 sets SL and SH equal to the bottom-of-strings pointer bytes, which now point to D$. All subsequent strings will be placed below this location. D$ will not be overwritten.

Lines 20 through 70 determine how many topics will be discussed. PERM$ is dimensioned accordingly, the file is opened, and the number of topics is written as the first item in the file.

Line 80 marks the top of the I-loop.

Line 85 POKEs the values of SL and SH back into the bottom-of-strings pointer. This is of no consequence the first time through, because no new strings were entered after SL and SH were set. This line will become useful on subsequent passes.

Lines 90 through 170 receive a topic, test for duplication, and reject all duplicates. Rejection leads back to line 85, where the pointer is reset so the next topic will overwrite the duplicate.

Line 175 is reached only when the input topic has been accepted. To preserve it as a permanent string, it sets SL and SH equal to the bottom-of-strings pointer, which now points to the first character of the just-input PERM$(I). Future strings will be placed below this location.

Lines 180 through 260 receive temporary strings A$ and B$, and write to the file all data generated by the current pass through the I-loop.

Line 270 increments I and, if more topics are to be discussed, it returns to the beginning of the I-loop at line 80. Now look at what line 85 will do! It POKEs SL and SH into the bottom-of-strings pointer, making it point once more to the beginning of the most recent permanent string. All temporary strings processed since then lie below this point, and will be overwritten when line 90 receives another permanent string! The garbage has been eliminated.

This technique got me out of a serious bind and into production. I hope it can do the same for you.

LISTING 2

```
]RUNBEFORE
HOW MANY TOPICS SHALL WE DISCUSS?3

NAME A TOPIC:COMPUTERS

DO YOU LIKE COMPUTERS?Y

WHY?I ENJOY PROGRAMMING


NAME A TOPIC:GARBAGE COLLECTION

DO YOU LIKE GARBAGE COLLECTION?N

WHY NOT?IT SLOWS DOWN MY PROGRAMS...ALWA
YS AT THE WORST POSSIBLE TIMES!

NAME A TOPIC:SELECTIVE STRING PRESERVATI
ON

DO YOU LIKE SELECTIVE STRING PRESERVATIO
N?Y

WHY?IT CONSERVES MEMORY AND DOESN'T WAST
E TIME!

THAT'S ALL FOR NOW. THANKS!
```

LISTING 3

```
]CALL-151
*6F.74
006F- 47
0070- 95 72 95 00 96
*9547 95FF
9547- 49                    I
9548- 54 20 43 4F 4E 53 45 52 T  C O N S E R
9550- 56 45 53 20 4D 45 4D 4F V E S  M E M O
9558- 52 59 20 41 4E 44 20 44 R Y  A N D  D
9560- 4F 45 53 4E 27 54 20 57 O E S N ' T  W
9568- 41 53 54 45 20 54 49 4D A S T E  T I M
9570- 45 21 59 53 45 4C 45 43 E ! Y S E L E C
9578- 54 49 56 45 20 53 54 52 T I V E  S T R
9580- 49 4E 47 20 50 52 45 53 I N G  P R E S
9588- 45 52 56 41 54 49 4F 4E E R V A T I O N
9590- 49 54 20 53 4C 4F 57 53 I T  S L O W S
9598- 20 44 4F 57 4E 20 4D 59   D O W N  M Y
95A0- 20 50 52 4F 47 52 41 4D   P R O G R A M
95A8- 53 2E 2E 2E 41 4C 57 41 S . . . A L W A
95B0- 59 53 20 41 54 20 54 48 Y S  A T  T H
95B8- 45 20 57 4F 52 53 54 20 E  W O R S T
95C0- 50 4F 53 53 49 42 4C 45 P O S S I B L E
95C8- 20 54 49 4D 45 53 21 4E   T I M E S ! N
95D0- 47 41 52 42 41 47 45 20 G A R B A G E
95D8- 43 4F 4C 4C 45 43 54 49 C O L L E C T I
95E0- 4F 4E 49 20 45 4E 4A 4F O N I  E N J O
95E8- 59 20 50 52 4F 47 52 41 Y  P R O G R A
95F0- 4D 4D 49 4E 47 59 43 4F M M I N G Y C O
95F8- 4D 50 55 54 45 52 53 04 M P U T E R S[d]
*3D0G
```

Strings start at $9547 and end below $9600.

Most recent temporary strings

Permanent and temporary strings in order of occurrence

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GARBAGEMEN STRIKE

LISTING 4

```
]RUNAFTER
HOW MANY TOPICS SHALL WE DISCUSS?3

NAME A TOPIC:COMPUTERS

DO YOU LIKE COMPUTERS?Y

WHY?I ENJOY PROGRAMMING


NAME A TOPIC:GARBAGE COLLECTION

DO YOU LIKE GARBAGE COLLECTION?N

WHY NOT?IT SLOWS DOWN MY PROGRAMS.. ALWA
YS AT THE WORST POSSIBLE TIMES!

NAME A TOPIC:SELECTIVE STRING PRESERVATI
ON

DO YOU LIKE SELECTIVE STRING PRESERVATIO
N?Y

WHY?IT CONSERVES MEMORY AND DOESN'T WAST
E TIME!

THAT'S ALL FOR NOW  THANKS!
```

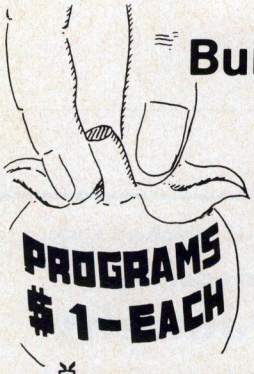
LISTING 5

```
]CALL-151
*6F 74
006F- 9B
0070- 95 C6 95 00 96
*959B.95FF
959B- 49 54 20 43 4F                I T   C O
95A0- 4E 53 45 52 56 45 53 20       N S E R V E S
95A8- 4D 45 4D 4F 52 59 20 41       M E M O R Y   A
95B0- 4E 44 20 44 4F 45 53 4E       N D   D O E S N
95B8- 27 54 20 57 41 53 54 45       ' T   W A S T E
95C0- 20 54 49 4D 45 21 59 53         T I M E ! Y S
95C8- 45 4C 45 43 54 49 56 45       E L E C T I V E
95D0- 20 53 54 52 49 4E 47 20         S T R I N G
95D8- 50 52 45 53 45 52 56 41       P R E S E R V A
95E0- 54 49 4F 4E 47 41 52 42       T I O N G A R B
95E8- 41 47 45 20 43 4F 4C 4C       A G E   C O L L
95F0- 45 43 54 49 4F 4E 43 4F       E C T I O N C O
95F8- 4D 50 55 54 45 52 53 04       M P U T E R S[d]
```

Strings start at $959B and end below $9600

Most recent temporary strings

All permanent strings are packed together: old temporary strings are gone!



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LISTING 6

Executing a FILEDUMP of the TOPICS file, or EXECing it with MON I in effect proves that all strings were written to the file, as intended.

```
]
]FILEDUMP TOPICS
3
COMPUTERS
Y
I ENJOY PROGRAMMING
GARBAGE COLLECTION
N
IT SLOWS DOWN MY PROGRAMS.. ALWAYS AT TH
E WORST POSSIBLE TIMES!
SELECTIVE STRING PRESERVATION
Y
IT CONSERVES MEMORY AND DOESN'T WASTE TI
ME!
```


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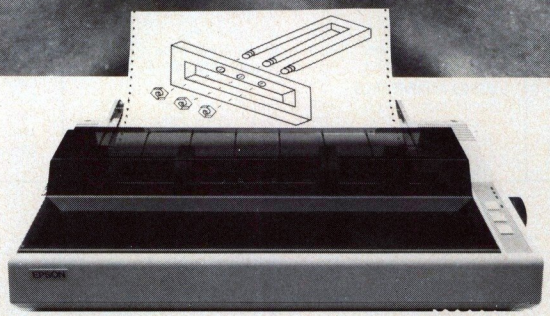

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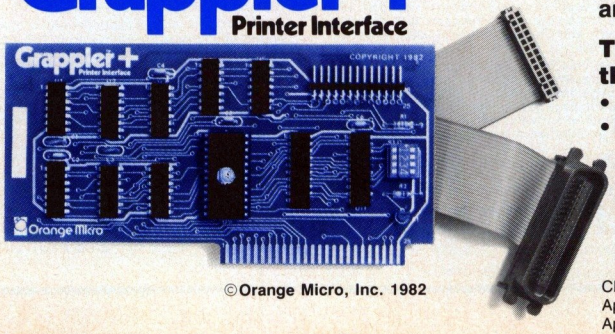

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Let us acquaint you with MESSAGE-MAKING SOFTWARE. Just place the disk in the APPLE, enter the text, and colorful, dynamic messages appear on the screens of TV sets connected to the computer. Use the software to broadcast messages on TV screens in schools, hospitals, factories, store window, exhibit booths, etc. The following program is our latest release:

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REQUIRES 48K & ROM APPLESOFT.....$40.

APPLE LITERATURE DATABASE: Allows rapid retrieval (via keywords) of references from total APPLE literature thru 1980, on 5.25" disk. Each entry in the data base consists of the article, author-name, periodical-name, date of issue, & page nos. The database is intended to support large magazine files which would require lengthy manual searching to recover information. Annual updates will be available.
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WORDPOWER: Is a simple, powerful, low cost, line-oriented word-processor program. It offers a fast machine language FIND & REPLACE. Text can be listed to screen or printer, with or without line-numbers. Lower-case adaptors are supported. You can merge files, move groups of lines, and easily add, change, or delete lines. WORDPOWER can be used to create and maintain EXEC files. It can also be used as a rapid, unstructured, information-storage and retrieval system via its rapid search capabilities.
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Total Recall

David Linker

QUICK, where is the disk with that great utility routine you entered from an issue of *Call — A.P.P.L.E.* last year? If you have more than a few disks, the method of locating that program will leave something to be desired. The solution to the problem lies in making the computer do the work of finding the disk from a multi-disk catalog.

Fortunately there already is a program called *Mult Disk Ctlg* on the Diskpak 6B which reads the catalog on each disk you enter and creates a text file containing the information. There is also a program called *File Cabinet II* on the same disk which can read the file and retrieve the data by search routines, or sort it. Sounds great, doesn't it?

The first time I tried the program I entered the catalogs of 20 disks with 595 programs. All went well until I tried to read them with *File Cabinet II.* The reading procedure took 45 minutes! Also, the estimated time for a sort was 194 minutes! Retrieval worked well once the data had been entered, but in 45 minutes I could have searched all the disks myself.

...Reading 595 titles took 45 minutes and sorting took 194!

Enter *Retrieve,* for total recall. This program, along with a short machine language subroutine, will enable you to rapidly load the files created by *Mult Disk Ctlg,* search for programs by title, strings in the title, volume (disk) number, or file type, and print the results on the screen or a printer. In addition, you can sort the files by volume number or title and save the sorted file under a new (or the same) name.

When you run the program it first asks you for the name of the file to load. If you don't know which files are available, you can enter "C" to see the catalog. After you have entered the name of the file, the program reads it in (for my test file this took 1:25). You then have your options displayed on a menu.

If you choose 1, the program will search for the title you give it. Anything after you hit return is a "wildcard," that is, it isn't used to determine the match. For example, if you enter "LIN <C/R>" the program would match it to "LINEAR REGRESSION," and "LINCOLN," but not "BLINE," or "LI REG." This type of search took 5 seconds with my test file. The programs that match will be listed on the screen or the printer, depending on which you specified. After the search is over, you will return to the menu.

If you choose 2, you can search for an imbedded string. If you were to enter "LIN <C/R>," the program would match it with the first three examples above, but not the last, and would also match "CUBIC SPLINES" and "CURVILINEAR INTERPOLATION." This type of search took 1:45 with my file.

The third entry on the menu causes a search by file type (A for Applesoft, I for Integer, B for binary, T for text, and R for relocatable). This type of search took about 7 seconds with my test file.

The fourth option allows a search by volume number, which is either the volume number of the disk, or a number you assigned when you used *Mult Disk Ctlg.* This option took six seconds.

If you like well ordered lists, the next two options are for you. Number 5 performs a sort by volume number, and number 6 performs a sort by title. These are the most costly functions in terms of computations and therefore time. A volume sort took eight minutes, while an alphabetic sort took only 2:53. If you now do a search, the results will come out in sort order.

...8 minutes is much better than 194...

Even though eight minutes is much better than 194, you only have to do it once because you can save the sorted file by using option 7. You can choose a filename, and if you want to view the catalog before committing yourself, you can enter "C" for the catalog. Finally, you can read in a new file through option 8, or quit using option 9.

The program is set up to reject invalid inputs, with the exception that it cannot check filenames. If for some reason you quit, or have an abnormal end due to an entry error, you can re-enter the program with the data intact by typing "GOTO 810."

The machine language routine uses the "&" vector for entry, and was extracted from "PRINT USING AND FRIENDS" in *Call —A.P.P.L.E. in Depth* 1, by Craig Peterson, and uses exactly the same syntax. If you have *PUF* already entered, you can use it without any modifications other than changing "BRUN SWAP" to "BRUN PUF" in line 710.

How It Works

In order to understand how the program works, and why it was necessary to program it in certain ways, we need to know why *File Cabinet II* has trouble with this file. When *File Cabinet* is run to enter the file, the disk drive runs for a while, and then stops for many minutes.

Then the drive starts up again and stops after a few seconds, to wait for another long period. This cycle repeats until all the data has been read in. The reason for the long delay has to do with how Applesoft handles strings and changes their value.

...The reasons for the long delay has to do with how Applesoft handles strings...

Applesoft stores a list of string names and pointers to where the actual value resides in memory. When you assign a new value to a string, the value is put in memory and the pointers are changed, but the old value is left in place, without any pointers to it. If your program has a lot of string value changes, these unused values can fill up memory. In order to prevent this, Applesoft will automatically do *garbage collection* when memory is almost full to clean out unused values. The catch is that when you have a large number of strings, this can take a long time (seven minutes in my test case!). If this occurs during a disk read, it will stop, and resume when the garbage has been discarded. If it occurs during a sort, well, don't hold your breath! For more details on Applesoft string handling and garbage collection, see "Applesoft From Bottom To Top" in *Call —A.P.P.L.E. in Depth 1.*

How can we avoid this? The first method is to avoid unnecessary string manipulations. In our case, this completely eliminated the problem during file reading and searches, and cut those times down to the times I quoted. All that remained was to shorten the sort time.

...I chose to use the "Quick Sort" Algorithm...

First we need an efficient sort algorithm. Fortunately, there was a good article on the subject in *Call —A.P.P.L.E.* in October 1980 by David Weston which compared ten sort algorithms. I chose to use the "Quicksort" algorithm, which will give one of the best sort times in most cases, and doesn't use a lot of extra memory. It is a gamble, but a fairly safe bet. There are unusual circumstances under which the search time will deteriorate, but they are extremely unlikely. The program uses a rewritten version of David's routine to sort strings and allow several arrays to be sorted simultaneously. The resulting routine was still very slow, but this time the reason was our old demon, garbage.

The solution lay in the collection of routines called *Print Using and Friends.* One of the routines is called *SWAP,* and what it does is trade two variable values without having to assign a temporary storage variable, and without creating any garbage! It

...The solution lies in trading string values...

does this by changing the pointers to the values, without moving the values themselves. Using that subroutine cut the sort times down to the values I mentioned above. If you have *PUF,* by all means use that file. If you don't, there is a listing of a assembly language routine at the end of this article which only does the swap and therefore is shorter. After entering the code through the monitor, reenter Applesoft and type "BSAVE SWAP,A$9581,L$7F<C/R>." if you have an assembler and want to move the routine to $300 to save space for strings, just change line 36 to a RTS, delete line 33, change 27 to ORG $300, and delete the variables LINNUM and RSHM. You can use the routine to swap any two variables of the same type in your programs. To use it in other programs, just "BRUN" it before you have used any string variables in your program, then use the syntax "& SWAP > var1,var2."

In RETRIEVE I used a little trick to avoid loading the routine a second time when you load another file. It is necessary to redimension the arrays for the second file, and an easy way to do this is to execute the statement "RUN," but we would rather not have to reload SWAP. The way this was avoided was to make sure that control-D was not the first character on the line the second time around, because then the print statement would not be read as a DOS command. in fact this was easy, since the preceeding statement was "GET S$," which does not generate a carriage return.

...GET. . . Does not generate a carriage return...

A few comments on the use of the program are in order. When you use MULT DISK CTLG to enter the programs, you are allowed a choice of the number of characters in the title you want to store. Too large a number will adversely affect the number of programs in the file and the length of time for a sub-string search, while too few may make several programs have the same titles. I use 22 characters, and with 595 programs in memory I have over 9K remaining (out of 48K). Next, all of the functions will be more efficient if you divide up your files in logical categories, such as "DOS 3.2 GAMES," or "DOS 3.3 BUSINESS." That way, since you know the category of program you are looking for, you will not have to load as large a file and everthing will take less time. On the few occasions when you do have to search all the files, the added time will be minimal.

That's it! Now what are you going to do with all the time you will save?

```
]LIST

10  REM

So What did you Expect Dept.

N. D. Greene : Call -A.P.P.L.E.

100  FOR N = 50 TO 1 STEP  - 1: FOR
     I = 49280 TO 49214:X =  PEEK
     (I): NEXT : FOR T = 1 TO 5 *
     N: NEXT : NEXT
```

```
]LIST

0  REM

MULTI-DISK CATALOG RETRIEVAL
       by David Linker

Call -A.P.P.L.E. : Aug. 1982

1  GOTO 710
4  REM
******* QUICKSORT ROUTINE ******

5 N$(N + 1) = "ZZZZZZZZZZZZZZZZZZ
     Z":V$(N + 1) = N$(N + 1):LW =
     0:HI = N:ST = 0
7  IF LW >  = HI THEN 31
9 J = HI + 1:I = LW:MID =  INT ((
     HI - LW) / 2) + LW
11  & SWAP > T$(MID),T$(LW): & SW
     AP > V$(MID),V$(LW): & SWAP >
     L$(MID),L$(LW): & SWAP > N$(
     MID),N$(LW)
13 I = I + 1: ON SW GOTO 37,41
15 J = J - 1: ON SW GOTO 45,49
17  IF J <  = I THEN 21
19  & SWAP > N$(I),N$(J): & SWAP >
     L$(I),L$(J): & SWAP > T$(I),
     T$(J): & SWAP > V$(I),V$(J):
      GOTO 13
21  & SWAP > V$(J),V$(LW): & SWAP
     > T$(J),T$(LW): & SWAP > L$
     (J),L$(LW): & SWAP > N$(J),N
     $(LW)
23  IF J - LW < HI - J THEN 27
25 B(ST + 1) = LW:B(ST + 2) = J -
     1:LW = J + 1: GOTO 29
27 B(ST + 1) = J + 1:B(ST + 2) =
     HI:HI = J - 1
29 ST = ST + 2: GOTO 7
31  IF ST = 0 THEN 35
33 HI = B(ST):LW = B(ST - 1):ST =
     ST - 2: GOTO 7
35  RETURN
37  IF V$(I) <  = V$(LW) THEN 13
39  GOTO 15
41  IF N$(I) <  = N$(LW) THEN 13
43  GOTO 15
45  IF V$(J) > V$(LW) THEN 15
47  GOTO 17
49  IF N$(J) > N$(LW) THEN 15
51  GOTO 17: REM

100  REM
**** SUBSTRING SEARCH ********

110  INPUT "STRING TO SEARCH FOR:
     ";S$:S =  LEN (S$):L =  LEN
     (N$(1)):IT = L - S + 1: GOSUB
     910
120  FOR I = 1 TO N: FOR M = 1 TO
     IT: IF  MID$ (N$(I),M,S) = S
     $ THEN  PRINT V$(I);" ";T$(I
     );"   ";L$(I);" ";N$(I):J =
     J + 1
130  NEXT : NEXT : RETURN : REM

200  REM
**** TITLE SEARCH *************

210  INPUT "TITLE TO SEARCH FOR:"
     ;S$:L =  LEN (S$): GOSUB 910

220  FOR I = 1 TO N: IF  LEFT$ (N
     $(I),L) = S$ THEN  PRINT V$(
     I);" ";T$(I);"   ";L$(I);" "
     ;N$(I):J = J + 1
230  NEXT : RETURN : REM

300  REM
**** VOLUME SEARCH ************

310  INPUT "VOLUME #:";V: GOSUB 9
     10
320  FOR I = 1 TO N: IF  VAL (V$(
     I)) = V THEN  PRINT V$(I);"
     ";T$(I);"   ";L$(I);" ";N$(I
     ):J = J + 1
330  NEXT : RETURN : REM

400  REM
**** TYPE SEARCH *************

410  INPUT "TYPE?(A/B/I/T/R):";S$
     : IF (S$ <  > "A") AND (S$ <
      > "B") AND (S$ <  > "I") AND
     (S$ <  > "T") AND (S$ <  > "
     R") THEN  GOTO 410
420  GOSUB 910: FOR I = 1 TO N: IF
     S$ = T$(I) THEN  PRINT V$(I)
     ;" ";T$(I);"   ";L$(I);" ";N
     $(I):J = J + 1
430  NEXT : RETURN : REM

500  REM
**** INPUT FILE ***************

510  PRINT D$"OPEN ";S$: PRINT D$
     "READ ";S$: INPUT N$:N =  VAL
     (N$): DIM V$(N + 1),T$(N + 1
     ),L$(N + 1),N$(N + 1),B(32):
     PC$ =  CHR$ (9) + "80N": REM
      80 COLUMN OUTPUT
520  FOR I = 1 TO N: INPUT V$(I),
     T$(I),L$(I),N$(I): NEXT : PRINT
     D$"CLOSE": RETURN : REM

600  REM
**** OUTPUT FILE **************

610  PRINT "WHAT FILE NAME?": GOSUB
     1200
620  PRINT D$"OPEN "S$: PRINT D$"
     WRITE "S$: PRINT N: FOR I =
     1 TO N: PRINT V$(I): PRINT T
     $(I): PRINT L$(I): PRINT N$(
     I): NEXT : PRINT D$"CLOSE":J
      = J + 1: RETURN : REM

700  REM
**** INITIAL SET UP ***********

710  PRINT  CHR$ (4)"BRUN SWAP":D
     $ =  CHR$ (13) +  CHR$ (4): HOME
     : VTAB (10): PRINT "WHICH FI
     LE SHOULD I LOAD?": GOSUB 12
     00
720  HOME : VTAB (10): FLASH : PRINT
     "READING FILES": NORMAL : GOSUB
     510: HOME : VTAB (4): REM

800  REM
**** MENU *********************

810  PRINT "DO YOU WANT TO:": PRINT
     : PRINT "1) SEARCH FOR TITLE
     ": PRINT "2) SEARCH FOR A SU
     B STRING": PRINT "3) SEARCH
     BY TYPE"
820  PRINT "4) SEARCH FOR VOLUME"
     : PRINT "5) SORT BY VOLUME":
      PRINT "6) SORT BY TITLE": PRINT
     "7) SAVE SORT FILE": PRINT "
     8) READ A NEW FILE": PRINT "
     9) QUIT": PRINT "YOUR SELECT
     ION?": GET S$:S =  ASC (S$) -
     48
830  IF (S < 1) OR (S > 9) THEN  HOME
     : GOTO 810
```

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TOTAL RECALL

```
840   IF (S >  = 1) AND (S <  = 4)
       THEN  PRINT : PRINT "DO YOU
       WANT TO PRINT RESULTS? (Y/N
      )": GET AS$: IF (AS$ <  > "N
      ") AND (AS$ <  > "Y") THEN  GOTO
      840
850   IF (S = 5) OR (S = 6) THEN S
      W = S - 4
860 J = 0: ON S GOSUB 210,110,410
      ,310,5,5,610,1000,1100: PRINT
      D$;"PR#0": IF J = 0 THEN  PRINT
      "NO RECORDS FOUND"
870   PRINT "HIT ANY KEY TO CONTIN
      UE": GET S$: HOME : GOTO 810
      : REM

900   REM
**** HEADER ROUTINE **********

910   IF AS$ = "Y" THEN  PRINT D$;
      "PR#1": PRINT PC$
920   HOME : PRINT "VOL TYP LEN TI
      TLE": PRINT "---------------
      ------------------------": RETURN
      : REM

999   REM
**** MISCELLANEOUS ROUTINES *

1000   RUN
1100   END
1200   INPUT "(ENTER 'C' FOR CATAL
      OG) FILE:";S$: IF S$ = "C" THEN
       HOME : PRINT D$;"CATALOG": PRINT
      "HIT ANY KEY TO CONTINUE": GET
      S$: GOTO 1200
1210   RETURN
```


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```
                    ********************************
                    *          & SWAP              *
                    *  Original by  Craig Peterson *
                    *  Call -A.P.P.L.E. in Depth 1 *
                    *   "PRINT USING AND FRIENDS"  *
                    *                              *
                    *   Adapted by  David Linker   *
                    * Call -A.P.P.L.E. : Aug. 1982 *
                    ********************************
                    *
                    AMPV      EQU  $03F5       ;'&' JUMP VECTOR
                    *
                    LINNUM    EQU  $50         ;GENERAL PORPOSE REGISTER
                    RSHM      EQU  $F28C       ;RESET HIMEM ROUTINE
                    CMD       EQU  $19         ;COMMAND NUMBER
                    TXTPTR    EQU  $B8         ;TEXT POINTER
                    SNTX      EQU  $DEC9       ;SYNTAX ERROR
                    ADDON     EQU  $D998       ;ADD Y TO TXTPTR
                    PTRGET    EQU  $DFE3       ;GET VARIABLE POINTER
                    FORPNT    EQU  $85         ;VARIABLE POINTER 1
                    VARNAM    EQU  $81         ;VARIABLE NAME
                    CHKCOM    EQU  $DEBE       ;CHECK FOR COMMA
                    MMCH      EQU  $DD76       ;MISMATCH ERROR
                    VARPNT    EQU  $83         ;VARIABLE POINTER 2
                    *
                    *
                              ORG  $9581       ;PROGRAM ORIGIN
                    *
                    *
9581: A2 02         INIT      LDX  #$02        ;SET UP '&' VCTR
9583: BD 91 95      INT1      LDA  AMPJ,X      ;AND RESET HIMEM
9586: 9D F5 03              STA  AMPV,X      ;AND BOTTOM OF
9589: 95 4F                 STA  LINNUM-1,X  ;STRING POINTERS
958B: CA                    DEX
958C: 10 F5                 BPL  INT1
958E: 4C 8C F2              JMP  RSHM        ;RESET HIMEM AND RETURN
9591: 4C 94 95      AMPJ      JMP  FNDC        ;'&' JUMP INSTR
                    *
                    *
9594: A2 00         FNDC      LDX  #$00        ;INIT INDEXES
9596: 86 19                 STX  CMD
9598: A0 00         FND1      LDY  #$00
959A: BD C1 95      LUP1      LDA  CTBL,X      ;GET COMMAND CHAR
959D: F0 12                 BEQ  FWND        ;IF 0,COMMAND FOUND
959F: C9 FF                 CMP  #$FF        ;IF=$FF, NO MORE
95A1: F0 08                 BEQ  ERR1        ;CMNDS TO ERROR
95A3: D1 B8                 CMP  (TXTPTR),Y
95A5: D0 07                 BNE  NXTC
95A7: C8                    INY
95A8: E8                    INX
95A9: D0 EF                 BNE  LUP1        ;ALWAYS BRANCH
95AB: 4C C9 DE      ERR1      JMP  SNTX        ;DO SYNTAX ERROR
95AE: 4C C9 DE      NXTC      JMP  SNTX        ;IF NO MATCH, SYNTAX ERR
95B1: 20 98 D9      FWND      JSR  ADDON       ;ADD Y TO TXTPTR
95B4: 06 19                 ASL  CMD
95B6: A6 19                 LDX  CMD
95B8: BD C9 95              LDA  ATBL+1,X    ;GO TO COMMAND
95BB: 48                    PHA              ;BY USING RTS
95BC: BD C8 95              LDA  ATBL,X
95BF: 48                    PHA
95C0: 60                    RTS
                    *
                    *
95C1: 53 57 41
95C4: 50 CF 00      CTBL      HEX  53574150CF00 ;SWAP COMMAND
95C7: FF                    HEX  FF          ;NO OTHERS!
                    *
95C8: C9 95         ATBL      DA   SWAP-1      ;ONLY ONE ADDRESS
                    *
95CA: 20 E3 DF      SWAP      JSR  PTRGET      ;GET VARIABLE ADDRESS
95CD: 85 85                 STA  FORPNT      ;SAVE IT IN FORPNT
95CF: 84 86                 STY  FORPNT+1
95D1: A5 81                 LDA  VARNAM      ;SAVE VARIABLE NAME
95D3: 48                    PHA              ;ON THE STACK
95D4: A5 82                 LDA  VARNAM+1
```

TOTAL RECALL

```
95D6:  48           75              PHA
95D7:  20 BE DE     76              JSR   CHKCOM      ;CHECK FOR COMMA
95DA:  20 E3 DF     77              JSR   PTRGET      ;GET NEXT VARIABLE ADDRESS
95DD:  68           78              PLA
95DE:  45 82        79              EOR   VARNAM+1    ;AGAINST FIRST VARIABLE
95E0:  30 1B        80              BMI   ERR2
95E2:  68           81              PLA
95E3:  45 81        82              EOR   VARNAM
95E5:  30 16        83              BMI   ERR2
95E7:  A0 02        84              LDY   #$02        ;GET SWAP COUNT
95E9:  24 82        85              BIT   VARNAM+1
95EB:  30 02        86              BMI   SWP1
95ED:  A0 04        87              LDY   #$04
95EF:  B1 85        88    SWP1      LDA   (FORPNT),Y;SWAP THE VARIABLES
95F1:  48           89              PHA
95F2:  B1 83        90              LDA   (VARPNT),Y
95F4:  91 85        91              STA   (FORPNT),Y
95F6:  68           92              PLA
95F7:  91 83        93              STA   (VARPNT),Y
95F9:  88           94    SWP2      DEY
95FA:  10 F3        95              BPL   SWP1
95FC:  60           96              RTS
95FD:  4C 76 DD     97    ERR2      JMP   MMCH        ;MISMATCH ERROR

--End assembly--

127 bytes

Errors: 0
```


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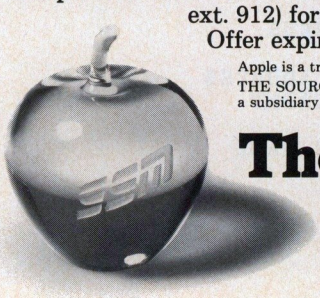

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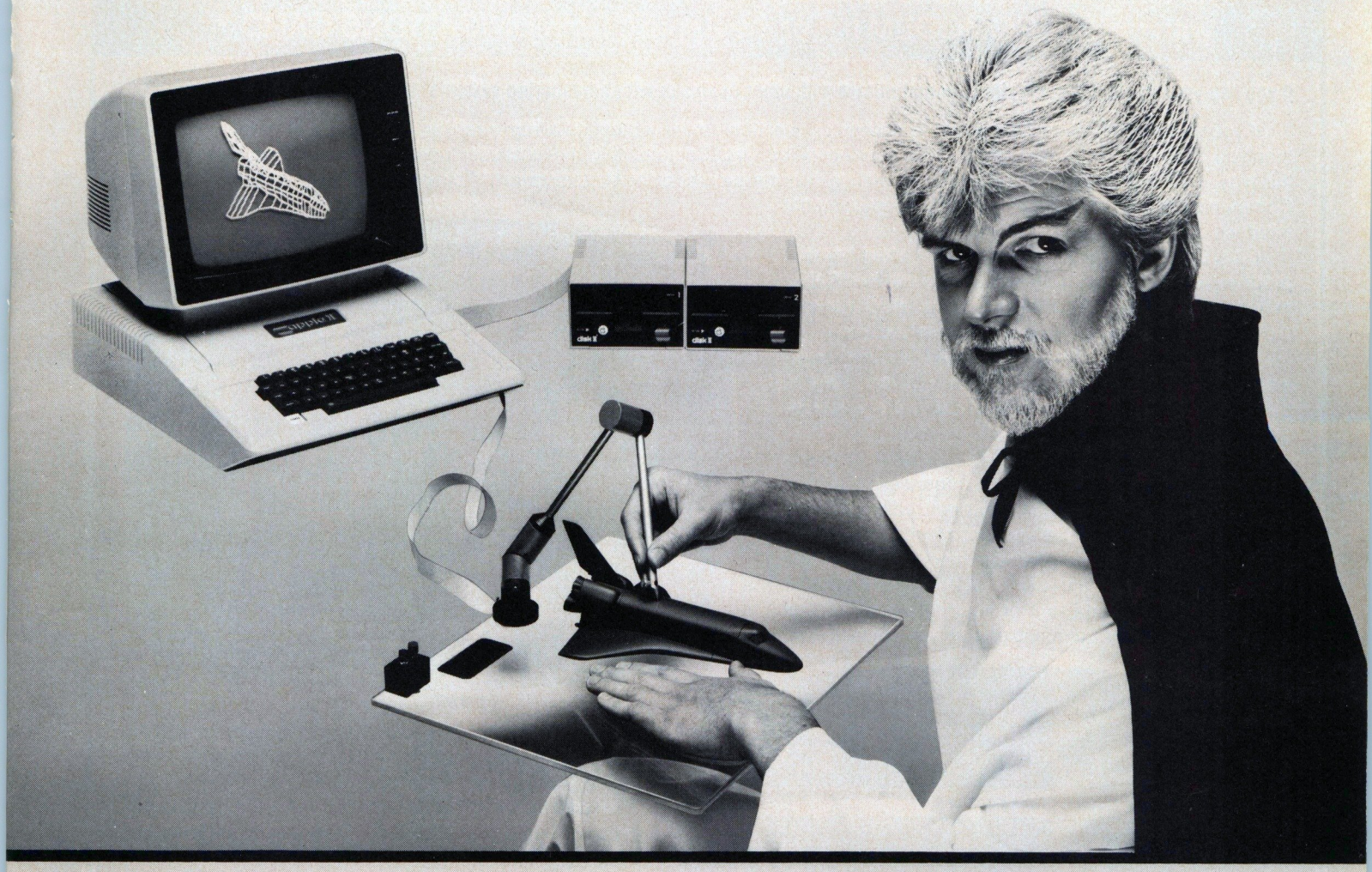

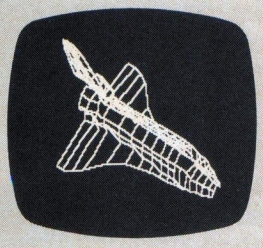

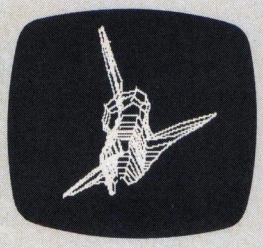

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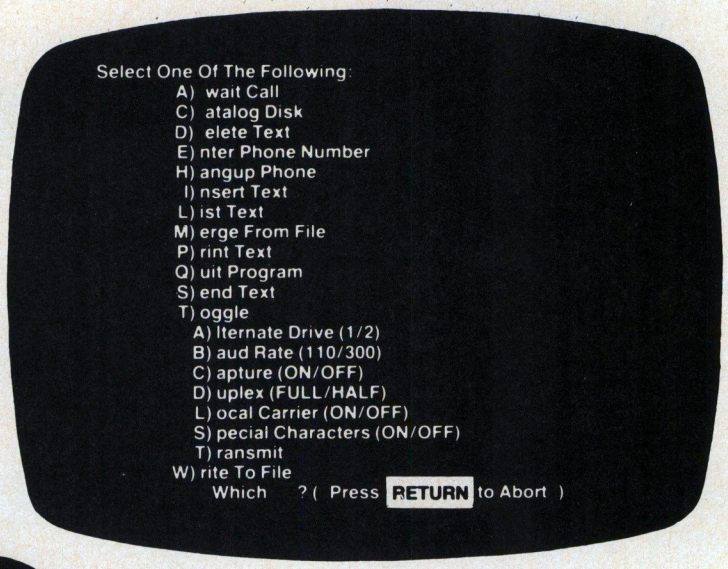

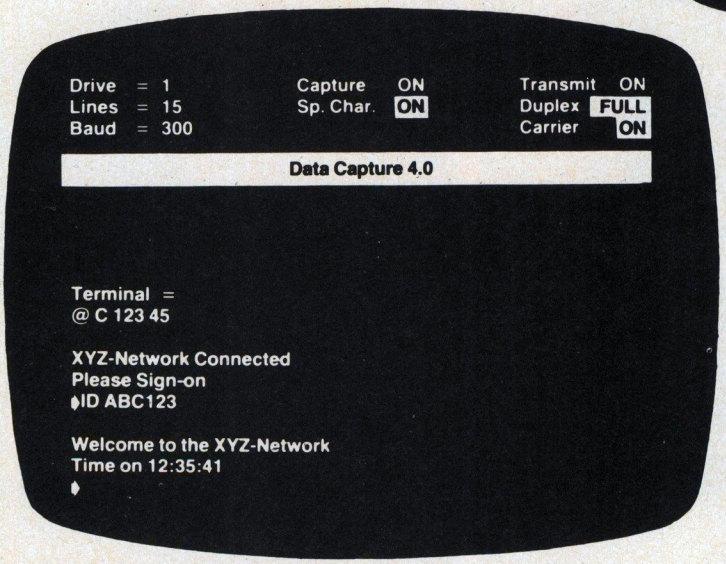

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A **Call —A.P.P.L.E.** REVIEW:

BASIS 108. . . An Alternative

Cornelis Bongers/Call —A.P.P.L.E. Staff Writer/Reviewer

1. Introduction

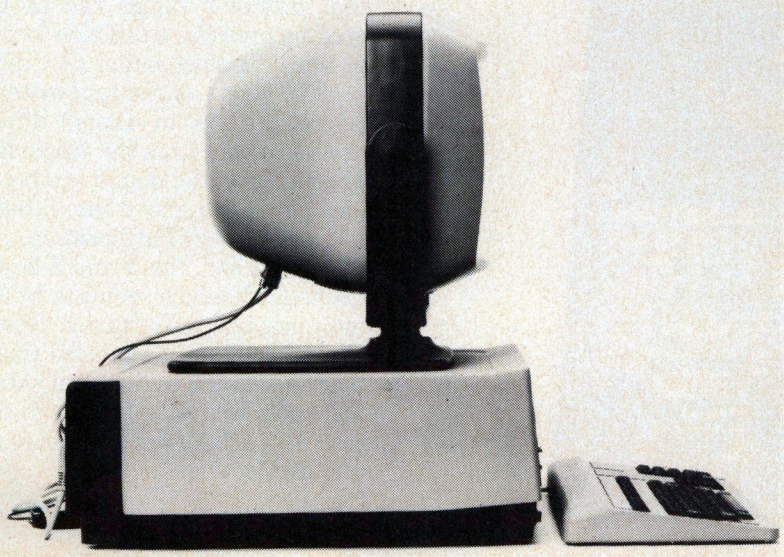
ABOUT three months ago we had our national Apple meeting. The meeting differed from earlier ones, because for the first time dealers and producers were invited to demonstrate their products. Represented was, among others, a German firm named BASIS microcomputer GMBH, which developed an Apple][compatible microcomputer called the BASIS 108. To me the specifications seemed too good to be true. In particular, I had my questions about Apple compatibility. I had brought with me to the meeting a set of disks with heavily system dependent software to test on the BASIS. To my great surprise, every program ran without problems!!

Of course, my interest in the BASIS grew immediately and I resolved to test the BASIS more thoroughly. The Dutch dealer of BASIS, *Vodenta* in Tiel, reacted very positively on my wish to have the BASIS installed in my office for some time. It is primarily due to their efforts that I am able to write this review.

When the machine arrived, it soon appeared that it had some bugs on the motherboard. Among others, the colors were very pale and the interface card reset key didn't work properly. Furthermore, the keyboard autorepeat started too quickly. Although I did some tests using this motherboard, I ran most of them on the upgraded A2 version (with the standard Apple ROMS). This motherboard worked fine, except that the HGR2 page showed flickering spots. This problem, however, was effectively eliminated by replacing a faulty chip.

As this review is specifically written for *Call –A.P.P.L.E.*, most of the readers will be Apple owners. Therefore, most of my attention shall be paid to the extra's (and differences) of the BASIS 108 in relation to the Apple][. The many important features the BASIS and the Apple have in common will not be discussed in detail. Readers who are not familiar with the Apple][should therefore read this review with caution, as it does not present a balanced treatment of all the capabilities of the BASIS. It should be further noted that the specifications of the BASIS 108 appear to be very similar to those of the soon-to-be-announced "Super][" by Apple.

I shall begin by giving a brief overview of the BASIS, followed by a detailed discussion of its specific features.



2. Brief Overview

The BASIS 108 is a single–board Apple][compatible microcomputer. It comes in two parts: a rather big aluminium covering and a separate keyboard with 100 keys. The covering has two openings into which floppy disk drives may be installed.

The BASIS has two microprocessors, a 6502 and a Z80. The latter is compatible with the Z80 softcard from Microsoft Inc. Standard is 64K of memory, however, BASIS also has empty sockets to plug in another 64K of RAM memory. In addition, there is a 2K monitor Eprom and five sockets are present for other Eproms (or ROMS).

Text and graphics on the BASIS work similarly to those of the Apple][. The BASIS has an additional feature; a built in 2K static RAM, which can be used to display text in 80 columns or low resolution graphics in an 80 by 48 format.

Contrary to the Apple, the BASIS has only six slots. The two slots not present are 0 and 1. Slot 1 is reserved for the parallel and the RS232c interface, which are both standard and built in on the BASIS.

On the back of the covering are connectors for B/W video, color video, an RGB signal and a cassette recorder. The joystick connector is on the motherboard.

Presently, the BASIS comes without BASIC ROMS and software, except for a ZAP diskette to convert Applesoft, Pascal 1.1, CPM and the Apple system monitor to 80 column format. In the near future, however, the USCD Pascal version V 4.0 will be released.

A REVIEW OF THE BASIS 108

The suggested retail price of the BASIS 108 (tax excluded) in the Netherlands is fl 4995 (U.S.A: $1949).

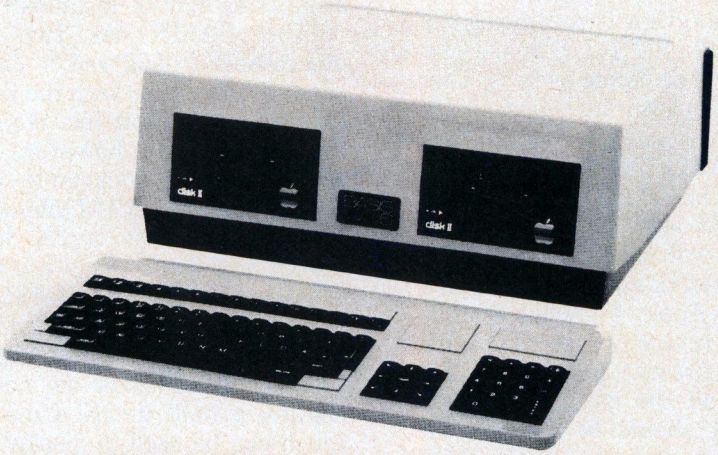
3. Specifics

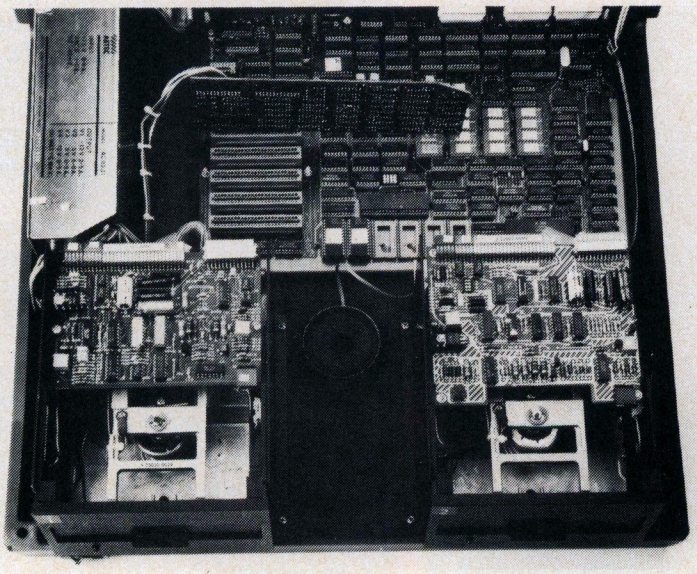
3.1 Construction and Power Supply

The BASIS board is installed in a very strong aluminium covering with dimensions 49cm x 19cm x 50cm (w x h x d). The covering contains the motherboard with six slots and a 220V/50Hz or 110V/60Hz power supply. The specifications of the power supply are:

INPUT	115v/0.6A or 230v/1.0A (50-60Hz)		
OUTPUT	V1	+12v	2.5A
	V2	+ 5v	6.0A
	V3	- 5v	0.5A
	V4	-12v	0.5A

In the front are two openings (on delivery covered with blindings), in which two Apple compatible 5¼ inch drives can be installed (see photo 1 and 2). When doing this, it is necessary to remove the cover from the drives, (an easy operation which does not require special "hardware" knowledge). There are two AC power outlets at the rear of the covering. These are controlled by the main power switch, which is located at the front, and can be used to connect a monitor or a printer. At the rear is also mounting space for six DP-25 connectors. Furthermore, there is a break thru for flat cables, two connectors for video signals, a DP-9 plug for an RGB signal and a DIN connector for a cassette recorder (see photo 3; this photo shows an earlier version of the BASIS, which had only one video connector).





3.2 Keyboard, Charactersets and Interrupt

The BASIS has a well designed separate keyboard which is connected to the main system by a 1.35m cable. The layout of the keyboard differs significantly from that of the Apple][. Apart from the normal typewriter-like keys, the keyboard also has another three groups of keys. To the right of the typewriter keys is a cluster of nine keys in a 3 by 3 matrix for cursor control. With these keys one can perform (when using the BASIS monitor) the following functions:

ESC A,B,C, and D
Right and left arrow
Clear to end of line
Clear to end of page
Home

To the right of the cursor control keys is a numeric keypad consisting of 18 keys. The keys represent the digits 0-9, the "=", the decimal point and the operators +,-,* and /. There is also a key marked CE which simulates the cancel line command (control X). It is worth noting that the return key on the numeric keypad doesn't behave like a return key, but generates a Ctrl D instead. This may accomodate Pascal users, but for BASIC users it is rather inconvenient.

On top of the keyboard are 15 function keys. These keys generate letters and symbols (like the typewriter keys), but by referring to a special location (see below) one can determine whether a function key has been pressed. With each function key, four different values can be generated by pressing a function key alone or with the shift and/or Ctrl key.

The layout of the typewriter keys (there are 56 of them) differ on several points from the Apple layout. For instance, the pound symbol is not located on top above the 3, but near the return key. Furthermore, on the machine I had, the Y and Z key were exchanged, which seems to be a common practice in Germany. However, BASIS Inc. has announced that keyboards adapted to different countries will soon be available. The U.S. version was scheduled for release at the end of May.

The alpha field has several extra keys, which generate among others the backslash, the left/right brackets ([]), the left/right braces ({ }) and the underscore (_). The keyboard also has a TAB, a DELETE and an alpha-lock key with a LED. All keys have autorepeat. To reset the BASIS, three keys must be pressed simultaneously, so it is virtually impossible to reset the system accidentally.

A disadvantage of the keyboard is that the pressing of a key required more effort than on the Apple. This has the effect that fast typists, who are not yet familiar with the keyboard, may miss some characters now and then. Fortunately, there is a remedy for this inconvenience. When removing the keycaps, a small plastic structure becomes visible. If this structure is turned 180 degrees, the keys are considerably easier to press.

Not being a very good typist myself, I asked two experienced secretaries to rate the keyboard. Both considered it — regarding "ease of typing" — approximately comparable to the keyboard of an electronic IBM typewriter.

The BASIS has four character sets (in a 4K 2732 Eprom). The standard character sets are:

1) Standard Apple][(64 characters)
2) Standard ASCII (128 characters)
3) German (128 characters)
4) APL

The different sets can be selected by performing a write operation to one (or a combination) of the addresses $C000–$C005. By writing to $C006 or $C007, the characters of sets 2–4 can be displayed as inverse or flashing, respectively.

By reading address $C008, one may request (among others) the keyboard status. The status information consists of:

bit 7 : Function key pressed
bit 6 : Shift key pressed
bit 5 : Non control key pressed
bit 4 : Any key hold down
bit 3 : Alpha lock on
bit 2 : HBL (horizontal blanking)
bit 1 : Video synchronization signal
bit 0 : Printer return

A very interesting feature of the BASIS is the possibility to generate keyboard interrupts. The keyboard interrupt can be enabled/disabled by writing to $C009/$C008. Provided the 6502 is interrupt enabled (which can be achieved by executing the CLI instruction), control will be transferred to the monitor interrupt handler if a key is being pressed. The interrupt handler saves the ACCU in location $45 (the status register and the program counter are "automatically" saved on the stack if the 6502 accepts the interrupt).

Next, control is transferred to the address in $3FE,$3FF, where the user can store the starting address of his own interrupt handler. The keyboard interrupt feature makes it possible to run programs in the background, while for instance data-entry takes place in the foreground. On the Apple][, this would soon lead to memory problems, but by installing 128K RAM on the BASIS, there is sufficient room to use this feature.

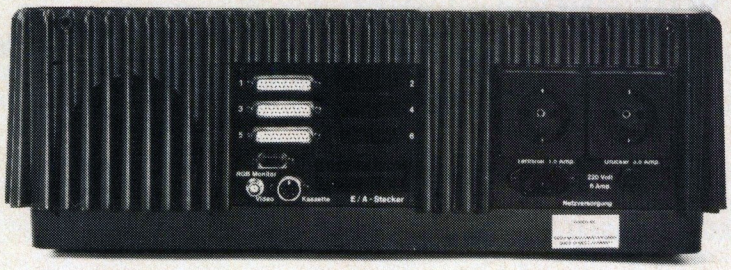
An interesting application of the keyboard interrupt is spooling output to a printer at the *same* time a program is edited. I didn't have the time to program a suitable printer driver, but did try the concept with a simple program, which constantly incremented a byte at $700 (so that it could be viewed on the screen). After setting the interrupt vector and patching the monitor read key routine, (so that it jumped to the program mentioned above instead of waiting for a key), everything worked excellently. I could enter programs and execute DOS commands, and every time keyboard input was expected, the screen counter started. Of course, the counter stopped when a program was running or when control was passed to DOS, but it became very clear that on data-entry or program editing, the 6502 has sufficient time left to do some other tasks.

3.3 Text and Graphics

Just like the Apple, the BASIS has two text, two Lo-Res and two Hi-Res pages. The text and graphics are in the same address range as those on the Apple and also the soft-switches (to switch between graphics and text) are identical to those on the Apple. However, the BASIS has an extremely valuable extra feature. Namely, a 2K static RAM which can be mapped in the address range $400-$BFF. The static RAM can be write and read enabled by performing a write operation to $C00D. A write operation to $C00C disables the static RAM. The static RAM can be used for three purposes:

1) as scratch memory
2) to enlarge the Lo-Res graphics to 80 by 48 format
3) to obtain 80 characters/line in text mode.

For the latter two purposes it is necessary to set a switch which causes the normal text page ($400-$7FF) and the part of the static



A REVIEW OF THE BASIS 108

RAM that is in the same address range to be displayed simultaneously on the screen. On the 80 column screen, the even positions in each line correspond to the normal text page, whereas the odd positions correspond to the static RAM. Before a character is sent to the screen, the horizontal cursor must be checked on as to whether odd or even.

This can be accomplished by a few machine language instructions. In case the cursor position is odd, the static RAM has to be enabled, so that the character will be stored in the right memory page. After the character has been stored, the static RAM must be turned off, for the upper part of the address range of the static RAM (i.e. $800–$BFF) is used by Applesoft.

The following (simplified) routine, derived from the BASIS monitor, illustrates the use of the static RAM. On entry, the cursor position must be stored in the Y-register, and the character to be displayed in the ACCU.

```
        PHA          save accu on stack
        TYA          get cursor position in
                     ACCU
        STY SAV      save cursor position
        LSR A        set carry if position is
                     odd
        TAY          put corrected position
                     in Y
        PLA          restore ACCU
        BCC DONT     branch if character
                     must be stored on
                     normal textpage
        STA $C00D    write/read enable static
                     Ram
DONT    STA (BASL),Y put character on screen
        STA $C00C    disable static Ram
        LDY SAV      restore cursor position
```

A similar sequence of instructions can be used to display LORES graphics in an 80 by 48 format. For this purpose it is necessary, however, to patch Applesoft, as Applesoft checks whether the first parameter of the PLOT statement doesn't exceed 40. Fortunately, there is no need to make the patch yourself, as the BASIS comes with a ZAP diskette which contains a utility to generate a new version of Applesoft from the Applesoft that is on the BASICs diskette. The BASICs diskette, and Pascal system diskette which are also needed for the conversion, must be supplied by the user.

As to Hi-Res graphics, there is — when working in black and white — one difference between the BASIS and the Apple. This difference lies with the BASIS bit 7 of a Hi-Res byte. If bit 7 is set, the remaining bits in the byte that are set will be displayed in white. In case bit 7 is not set, however, the remaining bits that are set will be displayed in grey. The BASIC HCOLOR=3 instruction (which causes bit 7 to be cleared) will therefore display a white color on the Apple, but a grey color in the BASIS. By specifying HCOLOR=7 (which causes bit 7 to be set), the color will be white on the BASIS as well as on the Apple. Therefore, a BASIC program developed on the Apple can easily be converted to the BASIS by changing the HCOLOR=3 instruction (if this instruction was used to obtain white) to HCOLOR=7.

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Regarding existing machine language software (games etc.) matters are much more complicated. It appears that in some Hi-Res software, the high bit was either not set or randomly set, giving a rather negative effect. All parts of a picture that should have been white were displayed in grey, or even worse, in a mixture of white and grey. On the positive side, many other programs displayed much better pictures. An example of one of these is Galaxian, displaying several details I never noted on the Apple. (Among others, the difference between 10 and 30 point invaders).

Nevertheless I feel it is important to have full compatibility with Apple Hi-Res software, and therefore phoned BASIS Inc., to ask how this could be obtained. I was told that the solution was very simple. It consists of installing a switch between a pin of an IC and its socket. If the switch is "off," only black and white will be displayed. If the switch is "on," one can make use of the BASIS capability to display white, grey and black. Installation of the switch indeed led to full (B&W) Hi-Res compatibility.

I was told by the BASIS spokesman that the switch is not implemented on the standard BASIS, but I suppose that most BASIS dealers will install the switch upon request.

As to colors, I tried the PAL signal with a Sony monitor and obtained good pictures, although the colors differed from those of the Apple. For instance. what is green on the Apple becomes blue on the BASIS. Basis Inc, intends to make the next version of the BASIS color-compatible with the Apple.

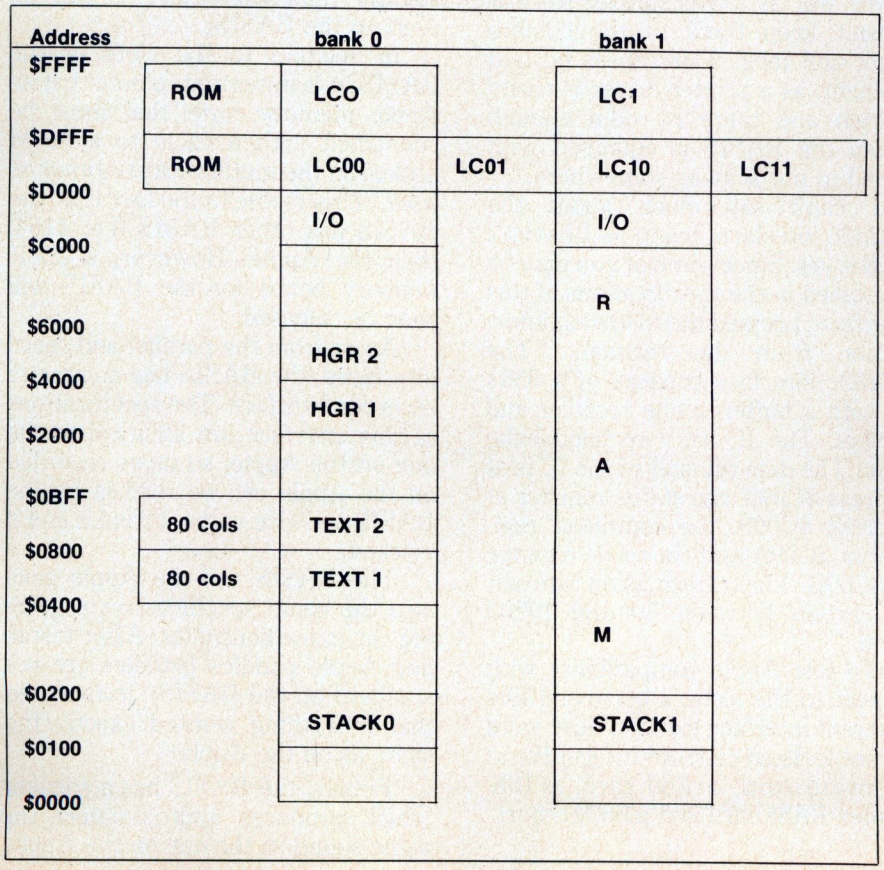
3.4 Memory

Figure 1 shows the memory map of the BASIS, which uses 4164 dynamic RAMS. Standard is 64K (Bank 0), but as mentioned before, this can easily be expanded to 128K. The costs of the extra 64K are approximately fl 320 (ex. tax). Apart from RAM memory, there are sockets for six 2K ROMS (or Eproms), but one of these is reserved for the system monitor. The remaining sockets can be used to plug in Applesoft or Integer Basic. You may also use Eproms instead of ROMS, but then you have to put two connectors on different pins, which are for this purpose installed on the motherboard.

The RAM memory range $D000-$FFFF (indicated in figure 1 by LC0 and LC00) can be accessed like a Language Card. The extra bank in the range $D000-$DFFF is also available. All my Apple][Language Card resident software (including Pascal) ran equally well on the BASIS. It is possible to prohibit switching between the ROM and RAM space by executing a write operation to $C00F. This causes the system not to recognize the softswitches $C080-$C08F anymore. If the write operation is performed when the RAM range $D000-$FFFF is enabled, switching back to the ROMS becomes impossible. By writing to $C00E (or resetting the system), the softswitches will be recognized again.

By expanding the BASIS to 128K, the complete memory range is doubled. Unlike the stack and zero page, the text and graphics screens are available in bank 0 only. Bank 1 can be switched in main memory in 8K blocks. This happens by performing a write operation to one or more of the addresses in the range $C060-$C06F. (even = off, odd = on).

Figure 1 Memory map of the BASIS 108



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For instance, by writing to $C067, the Bank 1 range $6000–$7FFF is mapped in memory and a write to $C066 causes a mapping of the same address range of bank 0.

It will be clear that the double memory range combines nicely with the keyboard interrupt. Programs that have to be executed in the background can be dumped as a whole in bank 1, so that you do not have to worry about reallocation. Note, however, that it is not possible to direct output of these programs directly to the screen, although with a little effort it will not be a big problem to program a utility output driver for this task.

Another useful application of the double memory range is related to the well known Hi-Res problem. When you have a large program that needs one or two Hi-Res pages, separate software is necessary (on the Apple) to split the program in two parts which reside below and above the Hi-Res pages, repectively. On the BASIS this can easily be avoided by using two 8K banks of bank 1. For this purpose several patches have to be made in Applesoft. First, on the warm/cold start of Applesoft, the two 8K banks of bank 1 have to be mapped in main memory. Second, on plotting a point on the Hi-Res screen the two (corresponding) banks of bank 0 have to be enabled and after plotting they have to be disabled again. I tried this concept and in only half an hours time everything worked fine. Note that apart from the fact that this solution is more convenient, it is also more memory efficient, since an additional 16K of RAM, previously occupied by the Hi-Res pages, is gained.

3.5 The Z80

Perhaps the most valuable feature of the BASIS is the Z80 processor that is installed on the motherboard. The Z80 is fully compatible with the Microsoft Z80 card, and can be activated by a write operation to $C100.

If a CPM disk is inserted into the drive, CPM will automatically be loaded on the PR#6 command (assuming the disk interface is in slot 6). All CPM software I have tried (most of it created with a Z80 card on the Apple) ran without any problems on the BASIS.

Adapting CPM to 80 columns is done by loading a file from the ZAP diskette. This file is then used to generate a new CPM system master from the old master, which must be supplied by the user. The conversion is an easy operation, which takes about ten minutes.

Apart from making 80 columns available, the conversion also leads to full keyboard support. For instance, Wordstar recognized the TAB and DELETE key and also the difference between Ctrl H and the "cursor left" key (which comes in handy if backspaces have to be sent to a printer).

3.6 Interfaces and Slots

The BASIS has (unlike the Apple) six slots, which are numbered from 2 to 7 (see photo 4). Slot 0 is reserved for the "simulated" Language Card and slot 1 for enabling the Z80 and the interfaces. Standard on the BASIS is a parallel interface and the RS232c serial interface. I tried the parallel interface with an Epson MX80 printer and it worked allright. A simple printer driver routine (which is recognized by Pascal and CPM) is located at $C100. However, for use with non-standard software, this driver will be too primitive, since it doesn't keep track of the column count and tabs. This causes no real problem, as a printer driver is easily written and there is room enough (when the BASIS is equipped with 128K) to put it away somewhere.

I can't say much about the RS232c interface, being as I haven't tried it yet. Since some of you may be interested in the specifications of this interface, I copied the following information from the manual. "The RS232c interface consists of a 6551 IC with a buffered line receiver and drivers. The IC has two handshake lines. The data register of the IC is at address $C098, the status register at address $C099, the command register at $C09A and the mode register at $C09B. The transmission rate can be chosen between 50 and 19200 baud."

To test Apple compatibility with respect to the slots, I borrowed five different interface cards. These were a Doublevision card, an Integer Basic firmware card, a Z80 card, a 16K Ramex RAM card and a 6809 Smartcard. The first three cards worked properly, but the other two gave me some problems. As to the Ramex card, it appeared that it was necessary to reset this card after power up, by typing $C0B2 from monitor command level (the card was installed in slot 3). After "hand-resetting" the Ramex card, it worked excellently and the system supported, without any problems, software that used both the Language Card and the Ramex card. The necessity to reset the Ramex card may have been caused by an error in the connection of the reset line to the slots on the old motherboard. Unfortunately, I had already returned the Ramex card before the upgraded A2 version of the motherboard arrived, so I was unable to test this card on the new motherboard.

Installing the 6809 card on the BASIS led to a system crash. I do not know why the 6809 card wouldn't work, but I suspect it has something to do with the system timing, which seems to be a critical factor when using the Smartcard. The spokesman of BASIS mentioned that they had similar problems with the 6809 Mill card. It seems that this card must be slightly modified before it can be used on the BASIS.

In relation to the slots of the BASIS, it is important to note that all Apple memory cards that must be connected with a cable to a RAM socket on the motherboard *cannot be used*. This is due to the fact that the BASIS has other RAMS (i.e. 4164) than the Apple. However, a 256K memory board for the BASIS will soon be released.

Apart from the parallel and serial interfaces, the BASIS has a cassette recorder interface. The specifications of this interface are identical to the one on the Apple, so tapes recorded on the Apple can be read in by the BASIS and vice versa. I tried it and it worked.

The BASIS and the Apple have also the same specifications regarding the game controller. After installing Apple paddles (paddles are not standard on the BASIS), it appeared that everything worked exactly the same as on the Apple.

Finally, the BASIS has a speaker which produces approximately the same sound as the one on the Apple.

3.7 Documentation, Software and System Setup

At the time I wrote this review, the documentation of the BASIS was not completely finished. I had at my disposal a preliminary draft of the manual (in German) and a summary in English. The manual give a good explanation of most features of the BASIS. Furthermore, there is an extensive description (with examples) of the 80 column monitor routines and commands. Most monitor commands differ from those of the Apple autostart monitor. For instance, instead of booting a diskette with 6 Ctrl-P, you have to type 6P. On the other hand, the entry points of the relevant monitor routines correspond to those of the autostart monitor, so most existing software runs equally well with the 80 column monitor. An exception is the software that accesses the screen directly, such as the Program Line Editor. Furthermore, the tape read/write routine is not implemented in the 80 column monitor, so the BASIC instructions SAVE, LOAD, STORE, RECALL and SHLOAD will not be available.

The manual should be improved on two points. First, some matters, such as keyboard interrupt and keyboard status information, are only briefly mentioned. A more complete description with some examples would be appropriate. Second, nothing is mentioned about incompatibilities between the BASIS 108 and the Apple][. Although there are only a few incompatibilities and most (if not all) are covered by this review, attention should be paid to them in the manual. For example, an attempt should be made to list the Apple interface cards that cannot be used on the BASIS

As I mentioned before, the BASIS comes without (a complete set of) BASIC ROMS and software. So, potential buyers of a BASIS must be prepared to buy the Applesoft or Integer Basic ROMS with the accompanying manuals or Pascal from Apple Inc. Also, if you want to use CPM, you have to buy the Z80 software from Microsoft.

The 80 column Applesoft that can be created with the ZAP diskette differs on several points from the original Applesoft. The differences are:

1) The GET instruction supports the function keys. For instance the following statements display the number of the function key pressed: GET A$: PRINT "FUNCTION KEY" ;ASC(A$)-192
2) The parameters of statements related to the GR mode (i.e. PLOT, HLIN etc.) may range from 0 - 79. This makes it possible to use the larger screen width of the BASIS. However, one has to make sure that the Y-parameter is not set to a value larger than 47, for otherwise the first lines of the program will be destroyed.
3) A change has been made in Applesoft's tokenization routine. This has the effect that keywords may be entered in lower case as well as in capitals. Furthermore, blanks in keywords are significant in the 80 column Applesoft. For instance, the statement: IF A THEN 100, will be executed without problems. It will thus *not* be parsed as IF AT HEN 100, as the original Applesoft does. On the other hand, if you enter: 100 P RINT, the 80 column Applesoft will not recognize the keyword PRINT.
4) Program listings are in 80 column format.
5) Blanks are generated to reach the appropriate (MOD 16) screen position if a comma is encountered in a PRINT statement. The original Applesoft stores only the calculated position in the cursor horizontal register, which has the disadvantage that characters that were already on the screen are not deleted.
6) FLASHING and INVERSE characters cannot be displayed together on the screen.
7) The instructions related to the use of a tape recorder are not available.

Regarding system setup, there are several possibilities. For a 128K system, the following setup seems (for the time being) the most attractive:

1) Put the original Applesoft ROMS and the Apple system monitor in the ROM sockets. This leads to full Apple][compatibility.
2) Create with the ZAP diskette a diskette with the 80 column Applesoft plus monitor and boot this diskette if you want to use 80 columns.
3) CPM expects that the 80 column monitor, delivered with the BASIS, is on the motherboard. The best way to circumvent this problem is to dump the 80 column monitor in the upper RAM range of bank 1 and to patch CPM accordingly. For this purpose, a program DV.COM has been developed. On entering the load-command DV, the system switches to 80 column mode.

Currently under development is a small plug with sockets for two monitors. By putting this plug in the F8 socket, one can switch between the BASIS 108 monitor and the standard Apple monitor (provided these are installed on the print).

4. Conclusion

Having now worked several weeks with the BASIS 108, I can state that it is an excellent system. In particular on the European market, its price/performance ratio is very good, as the BASIS has a comparatively low price and many valuable feature (i.e. 80 column, Z80, 64K RAM, professional keyboard, two interfaces, heavy power supply). Over here, the (advertised) price of the BASIS varies from fl 4200 (ex. tax), for the machine as is, to fl 4995 (ex. tax). In the latter price are included the original Applesoft ROMS, the Apple Autostart Monitor (installed by the BASIS dealer), and the Hi-Res switch.

Furthermore, overall compatibility with the Apple][is close to 100%. This has the important advantage that when buying a BASIS there is no need to wait for software developers to start their work, as the whole range of Apple][software is available.

Those readers who want to know more about the BASIS are referred to the following addresses:

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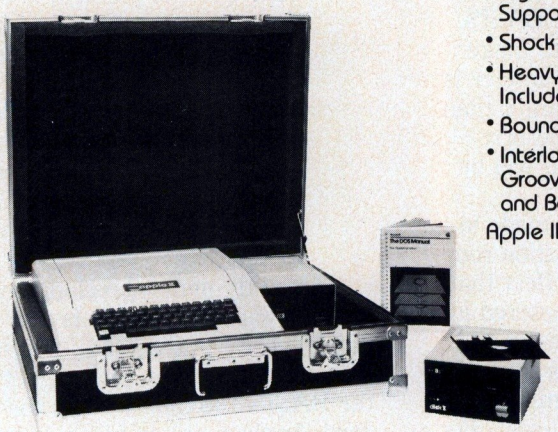

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Finally, it must be stressed that buyers of a BASIS should make *absolutely* sure that they get the upgraded A2 (or the A3) version of the motherboard, as there are some bugs in the older versions of the motherboard.

5. Acknowledgements

I am grateful to several people who have contributed to this review. First, I would like to express my gratitude to Mr. R.P. Vogel for putting the BASIS at my disposal. I also thank William Schouten, a well known Dutch Apple expert, for his valuable help in exploring the machine and developing some bank 1 resident software.

I am also grateful to Heinz Schmitz for implementing the Hi-Res switch and Diederik Gerth van Wijk for testing Pascal.

Finally, my thanks to Hans Geilenkirchedn, who shares my office at the University. Hans (a CBM [Pet] user) first lived patiently through the invasion of people who came to our office to see the BASIS. Enlightened by their enthusiasm, he very soon started participating in the testing.

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A Call —A.P.P.L.E. REVIEW:

Spelling Programs

Ralph H. Swerdlow, M.D./Call —A.P.P.L.E. Staff Writer

OUR Apples have ripened. They are no longer, if they ever were, only toys. They have become powerful, essential tools that make our daily tasks easier and more productive.

The metamorphosis has been accomplished partially by the introduction of Word Processor programs that now allow the APPLE user to type, edit and then print their thoughts with minimal efforts! However, until relatively recently, there was still the need to refer to a printed dictionary for the correct spelling of the words used in the documents prepared by the Word Processors. No longer is this true; we now have excellent software available to us that will allow us to check the spelling of the words in our documents. These programs are very powerful, easy to use and add a new dimension to our computers' capabilities.

In many ways all the Dictionary or Spelling programs are similar. They compare the spelling of the words in a document against a list of words that have been placed on a disk. If the word is not found, the program makes the assumption that the word is misspelled. This would be the same as if we listed all the words in our document, then consulted a "real" dictionary and checked each and every word for its correct spelling! The APPLE can do this task very rapidly and very accurately, not only finding misspelled words, but typing errors as well.

The differences between them are not great. Some require more changing of disks, are slightly faster or slower, can or cannot add new words to the dictionary disk, but they do differ in the number of words they contain.

According to the documentation accompanying one of the programs, the average person has a vocabulary of about 25,000 words, while the English language has approximately 600,000 words. Consider for a moment all the specialized words that are found in technical dictionaries! It is obvious that it would be almost a hopeless task to write a program that would include all possible words, tenses, and plurals, so the different

Ralph H. Swerdlow, M.D. is the author of the popular Call –A.P.P.L.E. series for beginners: "A is for Apple." Dr. Swerdlow has a unique talent for writing in simplistic, understandable terms characterized by his clarity, flow of logic and sequencing.

He is a physician at Kaiser–Permanente Hospital in Sacramento, California. He is board–certified in internal medicine as well as an associate professor in that field at the University of California; an adjunct professor in the Department of Electrical Engineering at Cal State University, also in Sacramento.

To add to his versatility, not only is he skilled in computer programming, but is a photographer, commercial pilot, FAA flight instructor and FAA physician-examiner. He recently appeared on the Phil Donahue TV show in his role as physician. He has been writing for Call –A.P.P.L.E. for over a year and is preparing for possible publication next year an expansion of his "A is for Apple" series.

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number of words in each package is of minor importance at the least, because no program can possibly contain all of the words that may be used by any author.

Lets look at some of these packages.

Goodspell was one of the first such programs, published late in 1980. It is part of the "Special Delivery" series created by Apple Computer,Inc., and is priced at $60.00. It can be used only by Applewriter, a word processing program also by Apple computer,Inc., which creates a binary file. Thus, its use is somewhat limited. There are now software packages available that are able to convert the text files created by other word processors to the binary format used by Applewriter, so with an extra step this is not a major limitation, but does take a few seconds more to use with other word processors.

Its vocabulary is limited to 14,000 words and it can check a document at the rate of about 3000 words per minute. This is equal to six or more pages per minute.

The program requires only one disk to use. The Master disk takes just a few seconds to boot. The user is asked to identify the slot of the printer, and then the program's vocabulary is loaded into the computer. This process takes 20–30 seconds. The disk with the Applewriter file is inserted into the active disk drive, and when asked, the user enters the name of the file he wishes checked for spelling. If desired, the disk containing the file to be checked can be inserted into an alternative drive, and the file name has added to it the appropriate slot and drive identification (,Sn,Dn). This is very convenient when you wish to check several files which happen to be on different disks. If no name is entered, a return will show the catalog of the disk, making it easy to find the exact spelling and name of the file that you wish to check. As your document is read, whenever a word is found that is not recognized by Goodspell, it is printed to the screen with several of the words preceding it, and several of the words following also shown so the word in question can be seen in the context that it was used. The user is then asked if the word is spelled correctly, which in many cases is true, but Goodspell did not have that particular word in its file. If the word is correctly spelled, hitting return will continue the scan of the file. If the user answered "yes" to the question, (or just hits return) that word is not labeled as misspelled, but is added to a temporary dictionary and if found again, will will not be identified as misspelled. This is very convenient when your file contains scientific words or many proper names. However, these new words are only added for that document. If another file is to be checked, this temporary dictionary no longer exists.

If the user answers "no", the word in question will be printed on the printer, so that the correct spelling can be found later, and corrected in your word processor document. The word is not marked in the file as misspelled, as done with the other spelling programs. The "hard copy" printout is more than sufficient to enable the user to use the search and replace function of Applewriter to later correct the document file, after the correct spelling is found in a "real dictionary" or the typing error is remedied.

Goodspell is easy to use, relatively fast, does well with its small vocabulary, and requires only one change of disks. (None if you have a two drive system). Its two biggest problems are those of a small vocabulary, and its inability to add new words permanently. For those who use Applewriter, this is a very nice, but limited package. It does not contain many simple words that are used often. The documentation accompanying the program is very short and states that any dictionary is limited in size, and commonly used words are not misspelled too often, thus were not included. I have found this to be true.

The DIC–TION–ARY is a two disk system by On–Line Systems of Coarsegold, California, that contains 25,000 words in its "wordbook" and can add another 1500 words to its permanent vocabulary. It is capable of reading documents created by Superscribe II as well as many other word processing programs which use either standard Text files or binary files. It can check the words of a ten page document in approximately five minutes.

The program comes with two disks, one called the "the program disk" and the other called, "word book." The program disk can not be copied, but the "word book" disk can, and the documentation urges the user to make a backup copy of the "word book." The user is even instructed how to make this backup.

The "program" disk is first booted, which takes almost 45 seconds, which bothers me somewhat; this may not be a problem to others though. The first thing to do is to configure the program to the word processor you are using. This is done by removing the write protect tab from the disk, and answering a few questions. These questions indicate the type of word processor to be used, and then continue with system configuration, including number of drives, character to use to indicate misspelled words, (which can be selected by the user) and the printer slot number. This information is saved to the master disk, but can be changed easily. After this step is completed, the write protect tab is replaced, and the program is ready to do its job.

The program is very much controlled by menu options, and after reading the documentation (which is only 16 pages) once or twice, I was able to use the program without referring to the printed material at all. Most, if not all of the options offered are selected by hitting the Return key which selects the default option. The program prompts the user when to change disks, and in which drive to insert each disk.

The first choice from the main menu is "DOCUMENT PROCESSOR." You are asked for the name of the file you wish to check, but there is not a means of looking at the catalog to obtain the file's exact spelling. Next the words in the chosen file are compared with the words contained in the "word book." There are two options at this point; all the words that the program does not recognize may be printed to your printer, giving you a hard copy, which you can view, and later correct the misspellings, or have words printed to the screen with five to ten words immediately preceding the word in question also visible. In this manner the context of your use of that word can be seen.

Now your options include ignoring the word, marking it as misspelled in your document, or adding the word to the dictionary. By indicating ignore, this word is added to a temporary dictionary, and if found again in the document, will be treated as correctly spelled. This makes it easy to check a file that has many unusual words or proper names that are used quite often in that one document. This temporary dictionary is transient for that file only! If "marking the misspelled words" is picked from the menu, these words will be found in your document, with the last letter of each word changed to whatever character you selected in the original configuration process. When you go back to the original word processor program, the use of the "find and/or replace" function makes it a snap to find and then correct these particular words!

From the main menu, the second option is "single word maintenance," which allows you to add words or delete words from the permanent dictionary one word at a time.

The third option is "file maintenance." This is used by creating a text file of the words that you want to add to the dictionary, and then use this new file as the document file for the program to read. This is done by using the word processor program of your choice, and merely typing in the words, but it is important to realize that these words must be spelled exactly right, because they will become a part of the permanent "word book" disk. In this way you can create individualized "word book" disks, each for a specific purpose. As an example, I have made several "word book" disks, one for writing about computers with the words that are used for this purpose, another for personal letter writing, with names of family members, and a third one which contains the words I use in my medical writing. This is easy to do, because the original word book disk can be copied with no problem, and then modified as desired!

The fourth option is "list dictionary", and if selected, will print to the screen or printer all the words contained in the "word book" However there is no way to list selected words. This is an option that I have not used much.

The package costs about $100.00, and is pleasant and easy to use. Its only disadvantage is the slowness (relative) of loading, and the need to change disks several times during any one session depending on which option is selected. This does require, on some occasions to change back to the main program disk, and then reinserting the word book disk. Not a major problem to this excellent addition to word processing. The documentation is short and easy to read. Replacement for a blown master disk may be purchased for $10.00.

The Sensible Speller is a product of Sensible Software of West Bloomfield, MI and costs $125. Portions of this review are based on an earlier version known as "Apple Speller," and thus may not be entirely accurate.

The Sensible speller is a four diskette package. The "program" disk and a back-up duplicate are copy protected. The remaining two disks, which may be copied, are dictionary disks based on the Random House Concise Dictionary. One disk is labeled "main dictionary" and contains 45000 commonly used words; the second is called "supplementary dictionary" and contains about 40000 less frequently used words. A copy of the hard-bound dictionary comes with the package. Words may be added to either dictionary disk.

This program is a delight to use. The documentation that comes with the package is easy to read, and the program logically presents options with a menu. The booting process takes a few seconds only, and then a "one time option" is presented to the user, which allows the configuration of the program to the system in use. The program does not enter the configuration data to the disk. This must be entered each time the program is first run. The process takes but a few seconds and is easily performed.

The Sensible Speller appears to be much faster than the other two programs. This may be only my opinion, though the advertisements for this program state, "It can read 5000 words/minute and check words at the incredible rate of 50,000 words/minute. This results in proof reading a ten page document without errors in one minute, or two minutes and 15 seconds with unlimited number of errors!" This speed rating is based on the earlier version, and significant improvements are claimed for the Sensible Speller.

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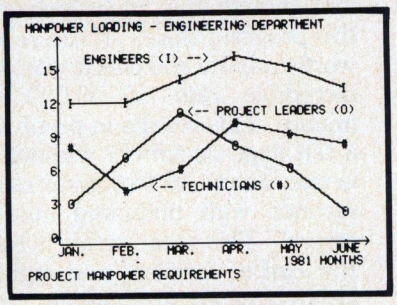

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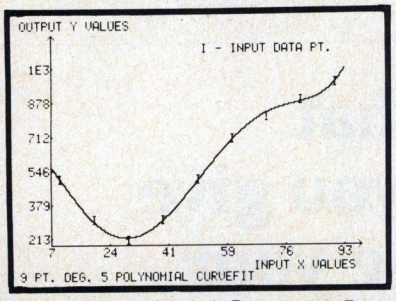

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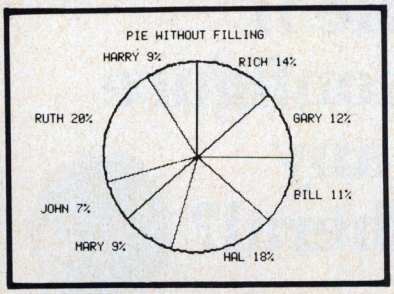

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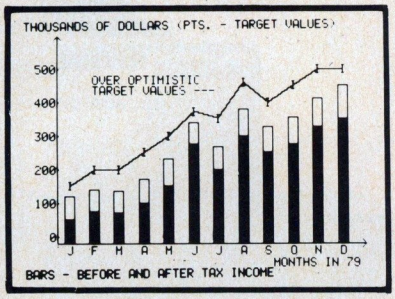

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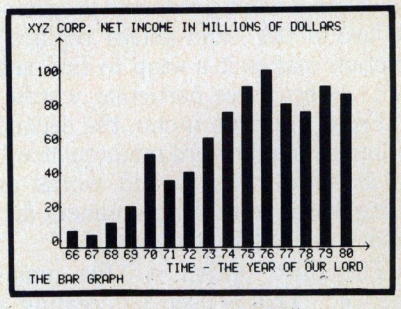

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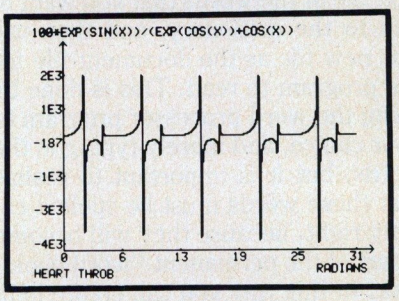

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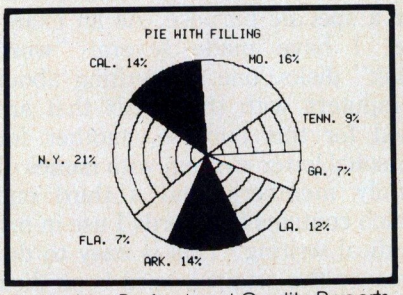

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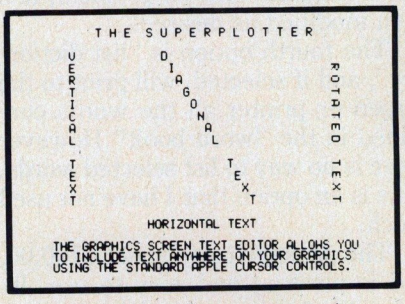

Plot Keyboard Characters on Any Graphics Display Simply

SPELLING

The "dictionary disk" is designed to be copied and the documentation tells how to do it. The main program disk is copy protected. The user is able to choose the speed that the program will print the words by using the game paddle. I have not used this at all, as the program seems to run at about the speed that is comfortable for me. For others though, this may or may not be important. If any key is pressed during the listing of words, the program will halt until another key is pressed, so the user does not really need the paddles to slow down the program.

The first thing the program asks is "proof read a document ?" The default answer is yes, and when answered, you are instructed to remove the program disk from drive one, insert the disk with the file you wished checked into drive 1, and the dictionary disk into drive 2, assuming you have a two drive system. If not, the program will prompt you where and when to insert each disk. Then, after hitting the return key, the catalog of your data disk is shown and you make your selection of which file to check. All that is needed is the first few letters of the file's name, and the program will load that file! This saves lots of typing, and reduces the risk of typing a file name incorrectly.

Next, the program will "read" the file that you selected, and present you with several options, listing all the words in your file, listing of only the misspelled words; a list of the misspelled is one that contains the words that the program does not recognize, even though they may be spelled quite correctly. The user is also given the option of verifying each word prior to its being marked, or the marking of each word judged to be misspelled by the program. This can make the checking of a document very, very rapid. As the program "reads" your file, the screen shows the number of words in the file, and the number of words on the "dictionary disk." This is sort of interesting to watch, and with this program, you can also print out all the words you used in your document, and their relative frequency of usage. The misspelled words are marked by replacing the last letter by any character chosen by the user.

What would you give to have TURTLEGRAPHICS, with automatic scaling, and four graphic modes, including HIRES and LORES, on your Apple II?

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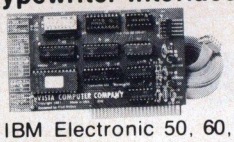
Typewriter Interface



Apple to IBM Electronic 50, 60, 75 Typewriters Interface

- Reads IBM keyboard in parallel with Apple keyboard
- Supports the IBM code functions using an escape sequence
- Types at about 13 characters per second
- Prints from Integer or Applesoft programs
- Supports the "Control I Number N" parallel line length mode sequence
- Has switch selectable upper/lower case I/O. 60, 66, 78 continuous form feed page lengths, 40+video, 80, 95, 132 character line lengths

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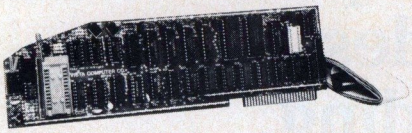
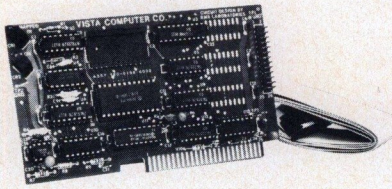


- Menu driven program development monitor
- Programs 2708, 2716, 2532, 2732 and 48016 EPROMS
- Simulates PROM from RAM (4K)
- Data and address interface for operator location and control
- Complete user documentation

Suggested price **$495.00**

VISION 40©



Softscreen programmable character/generator card for the Apple II computer

- Allows use of DOS tool kit upper/lower case character sets in Apple 40 column mode
- Permits creation of new alpha/numeric and graphic characters under Aminatrix
- Ideal for non-English language applications
- Compatible with most popular word processing software packages

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MODEL 150©
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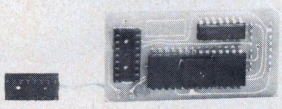

- Up to 40 character type ahead capability
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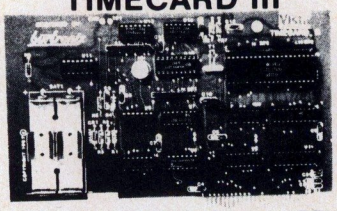
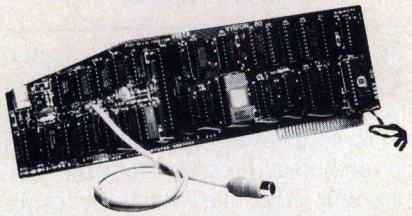


Multi-function time utility for the APPLE III computer system. Contains the year of the century, the month, the date, the day of week, the hour, the minute, the second.

- A countdown timer with a range of one millisecond to 999 hours, 59 minutes, 59 second, 999 milliseconds
- Selectable 12 or 24 hour time formats
- Diagnostic error reporting
- Fully compatible with the APPLE SOS operating system

Suggested price **$195.00**

VISION 80©
Video Display Card



- Full upper and lower case character capability with 3 dot descenders
- 9x10 dot matrix per line U.S. (9x11 Europe)
- 128 ASCII character set
- BASIC, FORTRAN and Pascal languages supported
- Z80™ and CP/M™ compatible
- Compatible with all standard Apple™ peripherals
- Shift and lock for upper and lower case
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- Rated #1 video card by **Softalk** and **Call Apple**

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V-1000

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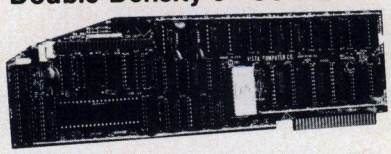

- High speed DMA transfer of data (1 micro-second/byte)
- Documentation provided — includes theory of operation and diskettes
- Uses all standard Apple DOS commands (OPEN, CATALOG, LOCK, DELETE, LOAD, ETC.) except for INIT which has been improved and enhanced in a Vista format routine
- Compatible with Apple DOS 3.3, Pascal 1.1 and CPM 2.2 (with the Z80 soft card by Microsoft)
- 2K x 8 PROM contains Autoboot functions and all eight-inch floppy driver code allowing complete compatibility with Apple DOS 3.3

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SPELLING

Later the "search/replace" function of your word processor program is used to find the character and correct the word. A list of misspelled words can be printed to either the screen or your printer by selecting the slot that the list will be printed to. A few preceding and following words are also printed to give you the context in which the word in question was used. Other options include adding the word to the dictionary disk, ignoring the word, or deleting the word from the dictionary.

If you select the option of adding words to the dictionary, a disk is inserted into drive 1, and all the words included in the "old dictionary disk" in drive 2, plus the words that you requested to be added to the dictionary will be transferred to the disk in drive 1, leaving the contents of the dictionary in drive 2 unchanged. The same process may be used to delete words from the new dictionary. After the disk in drive 1 is finished, you will have two dictionary disks. In this way you can create as many disks with specialized words as desired. By writing a list of words you wish to add to the dictionary disk, using your word processor program, you can create multiple special purpose dictionary disks, being careful to spell each word correctly.

The Sensible Speller has an option that almost replaces a real dictionary. The user can ask for a list of all the words contained on the "dictionary disk." This enables the user to ask for all words that begin with one letter or a sequence of letters. Thus, if you do not know the exact spelling of a word, but do know the first few letters, you can find the correct spelling if that word is in the dictionary disk. This saves looking up the word in a real dictionary.

The Sensible speller works with Apple Writer I and II and most popular word processors, as well as in emulation mode on the Apple *III* and separate versions are available that support Super Text, Pascal, Word Star and other CP/M processors that do not compress text.

What would you give to develop programs for the IBM PC, TRS 80 Model II, T.I. 99/4 Home Computer, and Xerox 820 on your Apple II?

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SPELLING PROGRAMS

There are several important things to remember when a spelling program is used. They will indeed find and call to the user's attention words that they do not recognize, but they can not read the mind of the user. For example, if your cousin is named Thadeus, and you write to him, none of the programs is likely to have this name present in its original form. Thus this name will be identified as being spelled incorrectly until it is added to the dictionary. Most important, is that no program can identify a word that is spelled correctly but is not used correctly. These words are called homonyms. For example if you meant to type "hear," but instead typed "here," you would not be told that you goofed since "here" is a properly spelled word. Also many words start with the same sequence of letters, for example then, them, and they, and if you only typed the first three letters, the computer will assume you were correct because "the" is a proper word. Thus these programs are a great time saver, but they do not substitute for careful proof reading of important files or documents. Their main use is to find misspellings or typos; they do not correct either!!

I have found them to be a great time and paper saver, because they will find not only misspelled words, but typing errors also. Thus I can write a story or letter, and let one of the spelling programs do the first checking of my efforts. This seems to correct 90% of the errors that I make, and saves me one or two printings to proof read a document.

The combination of any of the spelling programs discussed along with a newer word processing program, makes writing documents, letters or stories almost painless. Which one do I use, and which one do I prefer, you might ask. I use each of the spelling programs discusssed. Each has some aspects that I particularly like, and each has a few minor things that I don't like. Of the three programs, it is my opinion that The Sensible Speller is the best, with a larger original vocabulary, and the greater capacity to add permanent words. It also has the ability of creating additional "dictionaries" at will, and does seem to do its job faster, as well as the ability to see the catalog of the files on your document disk. The printing of the selected words from the dictionary words to check for spelling is also a very fine option.

I am sure that the next few years (or months) will see more spelling programs, some which may well beat each of the three discussed in this article. Now if only some one could come up with a program to do the typing...

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A Call —A.P.P.L.E. TECHNIQUE:

EXECUTING DEFERRED COMMANDS FROM THE KEYBOARD

C. Dorsman

HAVING read the article "Applesoft Internal Structure" by C.K. Mesztenyi (*Call -A.P.P.L.E.* Jan. 82), I implemented what could be called a "deferred mode immediate mode statement executor" which can be used as extremely flexible BASIC debugging aid.

The routine is linked to BASIC via the "&" command. When & is encountered in a program, control is passed to the routine which first prints "PAUSED IN" followed by the current line number. Next, the stack is set up as if a BASIC "GOSUB" had been encountered; the return address is pushed followed by the return line number and the token for GOSUB. Instead of branching to a subroutine, return is passed back to BASIC immediate mode by exiting through $D43C. Any command may now be entered from the keyboard until the BASIC "RETURN" is entered, at which time control passes back to the stored program at the statement directly following the "&" where the program was interrupted, and the program will continue running as if it had never been stopped.

"&" could now be inserted in several places in a program and used, for example, as a very flexible debugging aid. Run the following program to show how easy it is to use.

```
10 FOR I = 1 to 10000
20 PRINT I*I, SQR(1)
30 K = PEEK(-16384): IF K = 137
   THEN POKE -16368,0:&
40 NEXT
```

Line 30 tests if a Ctrl–I has been pressed and if so return is passed to BASIC. You may now type in commands such as:

PRINT I
PRINT K etc.

Type the following to show that even the value of the loop counter may be changed if desired.

I = 1000 : RETURN

Of course, you do not have to "RETURN" to the contolling program but may continue in BASIC. In this case it is wise to tidy the stack by using the command "POP" from the keyboard. This will clear the return addresses from the stack causing "RETURN WITHOUT GOSUB ERROR" if a RETURN is now attempted. If, however, the & is encountered within a subroutine and RETURN is executed after a POP, then control will pass back to the program at the statement following the GOSUB to the subroutine where the & was found.

The code can be relocated to reside in any free 60 bytes of memory as long as the & vector points to its start and the address of the message in line 35 correctly points at the ASCII bytes in line 53.

```
:ASM
                    ********************************
                    *                              *
                    *    "Immediate Commands"      *
                    *        by C Dorsman          *
                    *                              *
                    * Call -A.P.P.L.E. : Aug  1982 *
                    *                              *
                    ********************************
                    *
                    JMP       EQU   $4C
                    GOSUB     EQU   $B0
                    TEXTPTR   EQU   $B8
                    CURRLIN   EQU   $75
                    AMPVEC    EQU   $3F5
                    NESTCHK   EQU   $D3D6
                    BASIC     EQU   $D43C
                    INPRT     EQU   $ED19
                    COUT      EQU   $FDF0
                    *
                              ORG   $300
                    *
                    * Set & Jump vector
                    *
0300: A9 4C         INIT      LDA   #JMP
0302: 8D F5 03                STA   AMPVEC
0305: A9 10                   LDA   #<ENTRY
0307: 8D F6 03                STA   AMPVEC+1
030A: A9 03                   LDA   #>ENTRY
030C: 8D F7 03                STA   AMPVEC+2
030F: 60                      RTS
                    *
                    * Come here from BASIC "&"
                    *
0310: A2 06         ENTRY     LDX   #6
0312: BD 35 03      LOOP      LDA   MESSAGE,X
0315: 20 F0 FD                JSR   COUT
0318: CA                      DEX
0319: 10 F7                   BPL   LOOP          ;PRINT "PAUSED"
031B: 20 19 ED                JSR   INPRT         ;"IN" line number
031E: A9 03                   LDA   #3
0320: 20 D6 D3                JSR   NESTCHK       ;Check nesting
0323: A5 B9                   LDA   TEXTPTR+1     ;level-max. Nestin=25
0325: 48                      PHA
0326: A5 B8                   LDA   TEXTPTR
0328: 48                      PHA                 ;Push return address
0329: A5 76                   LDA   CURRLIN+1
032B: 48                      PHA
032C: A5 75                   LDA   CURRLIN
032E: 48                      PHA                 ;Push return line no.
032F: A9 B0                   LDA   #GOSUB
0331: 48                      PHA                 ;Push "GOSUB" token; "return without GOSUB" check
0332: 4C 3C D4                JMP   BASIC         ;Execute imm. command by returning to BASIC
0335: C4 C5 D3
0338: D5 C1 D0      MESSAGE   ASC   "DESUAP"      ;"PAUSED" backwards
033B: 8D                      HEX   8D            ;Carriage return

--End assembly--      60 bytes      Errors: 0
```

What would you do if you missed out on this offer?

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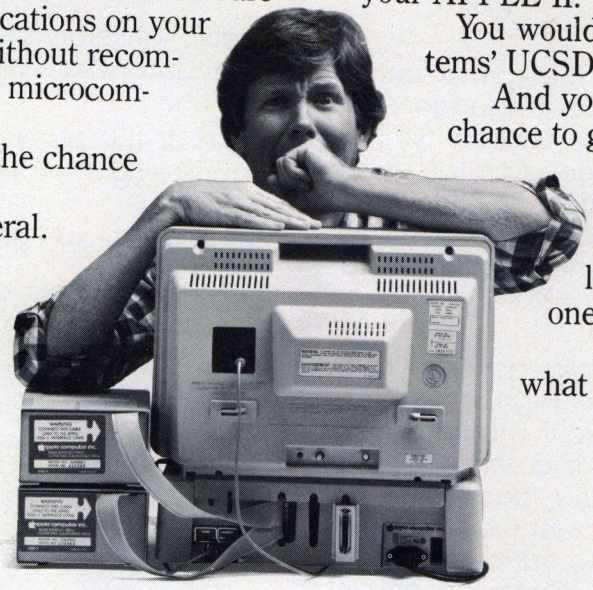

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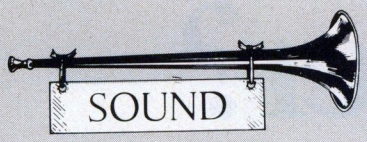

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A Call —A.P.P.L.E. TECH NOTE:

BEWARE THE $CFxx

David Goss

A potential trap awaits designers of peripheral cards which use the $C800–$CFFF expansion memory space. The following article describes the problem and the way to avoid it.

System architecture of the Apple provides for 2K of expansion memory in the address space $C800 thru $CFFF. This space is often used by Read Only Memory (ROM) on peripheral cards, and is also used as a RAM display buffer by some 80-column cards. To make it possible for more than one card to use this memory area, a protocol has been defined by which a read or write to $CFFF is to turn off the expansion memory on all cards. Control of the $C800 – $CFFF memory can therefore be passed to a selected card by allowing that card to output the $CFFF address and then enable its own ROM or RAM. The protocol is defined in the Reference Manual (p.84) and in the documentation for the Hobby/Prototype Card. The manual also describes a shortcut method for decoding the turn–off command. Called CFxx decoding, this method ignores the least significant eight bits of the address and will respond to any address in the $CF00 – $CFFF range. It simplifies the decode logic, but prohibits the user from accessing the last 256 bytes of expansion memory.

I recently designed and constructed a custom ROM circuit for my own Apple][. Since I did not need the last 256 bytes (and being lazy) I followed the manual's example and used the CFxx decode. The circuit worked just fine – except that every time an Applesoft program was run the ROM got turned off!!! A little experimenting showed that certain Applesoft comands (CHR$ for example) would do it consistently in either direct or deferred execution mode. My first thought was that I had made a wiring error of some sort, but when everything checked out, I got very curious as to what was going on.

Connecting an oscilloscope to the circuit lead to the discovery that the I/O STROBE line on the bus was being activated each time CHR$ was executed. That indicated that CHR$ was generating an address in the $C800 – $CFFF range, but why?

At that point I called Val Golding on the Hotline and asked for help. Val referred me to Dave Lingwood in Seattle. Dave was not aware of the problem, but quickly verified that it did exist and made some suggestions on ways to isolate the cause.

Following Dave's advice I temporarily wired the card so that the ROM disable signal would activate the Non–Maskable Interrupt on the bus. The interrupt vector was set to a machine language BRK instruction which caused the processor to halt whenever the ROM became disabled.

One of the things that the 6502 does when it gets an interrupt is to save the current contents of the program counter on the stack, before going on to process the interrupt. It was therefore possible, by examining the stack after an interrupt, to discover the location in program memory where the interrupt occured. What that showed was that it was being generated by a series of instructions in Applesoft ROM as shown below:

```
DF3F–  LDA   $CFDC,Y
DF42–  STA   $91
DF44–  LDA   $CFDD,Y
DF47–  STA   $92
DF49–  JSR   $90
```

I do not know what function these instructions are performing, but they appear to be common to a number of Applesoft commands. These include all of the string functions (CHR$, STR$, RIGHT$, MID$, etc.), all of the math functions (ABS, INT, RND, etc.) plus several others including PDL, PEEK, and POS.

The cause of the problem is the two LDA instructions at DF3F and DF44. These are machine language instructions which use absolute indexed addressing to load the 6502 accumulator. The address from which data is read to load the accumulator is derived by adding the base address (e.g. CFDC) to the value of the Y register. For example, if Y = CE the indexed address becomes CFDC + CE = DOAA.

That address, as are all addresses generated by these instructions, is in the Applesoft ROM. There is a quirk in the operation of the 6502, however, that causes a false read to be generated during the process of executing an indexed instruction which crosses a memory page boundary. The false read is ignored by the 6502 and so normally causes no problem, but its address is always in the base address page. In this case that is our old friend CFxx, and that is what was turning off the ROM.

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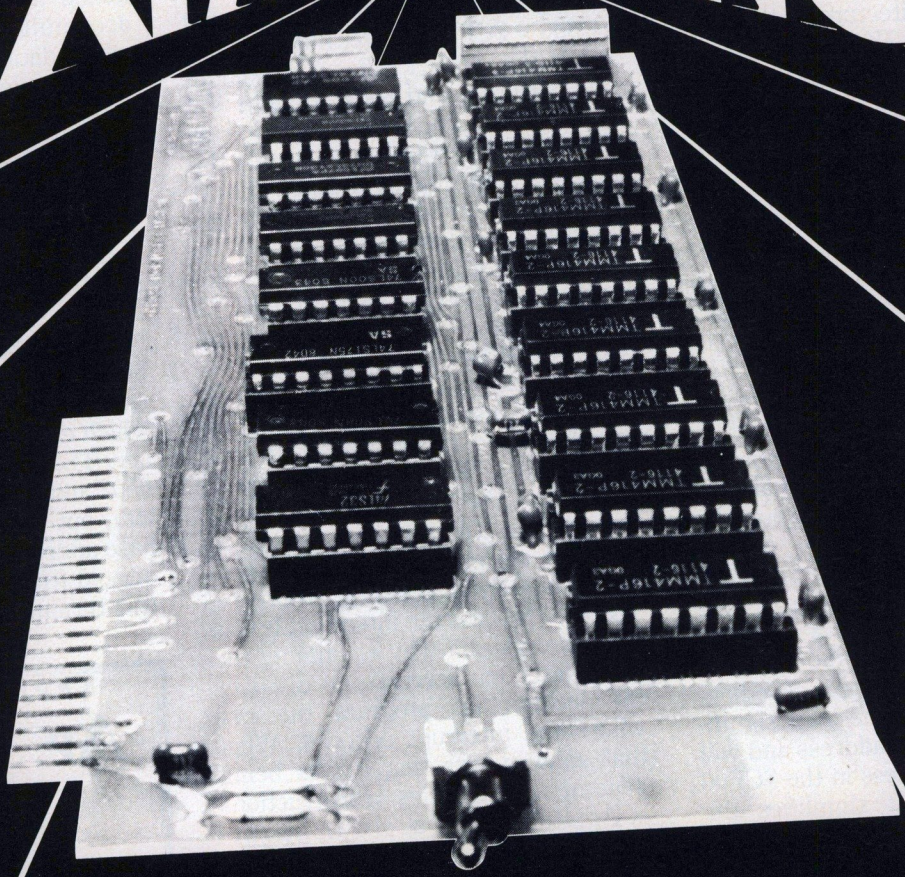

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BEWARE THE $CFXX

The solution to the problem is, of course, to decode the full sixteen bits of the address so that only $CFFF will disable the ROM. Figure 1 shows two methods of doing that. One uses standard LS logic and the other uses a 13-input Schottky gate. The second method uses fewer parts, but caution must be used when connecting Schottky logic directly to the bus. It has a loading effect that is approximately five times greater than LS logic, and so could exceed bus fan-out specifications.

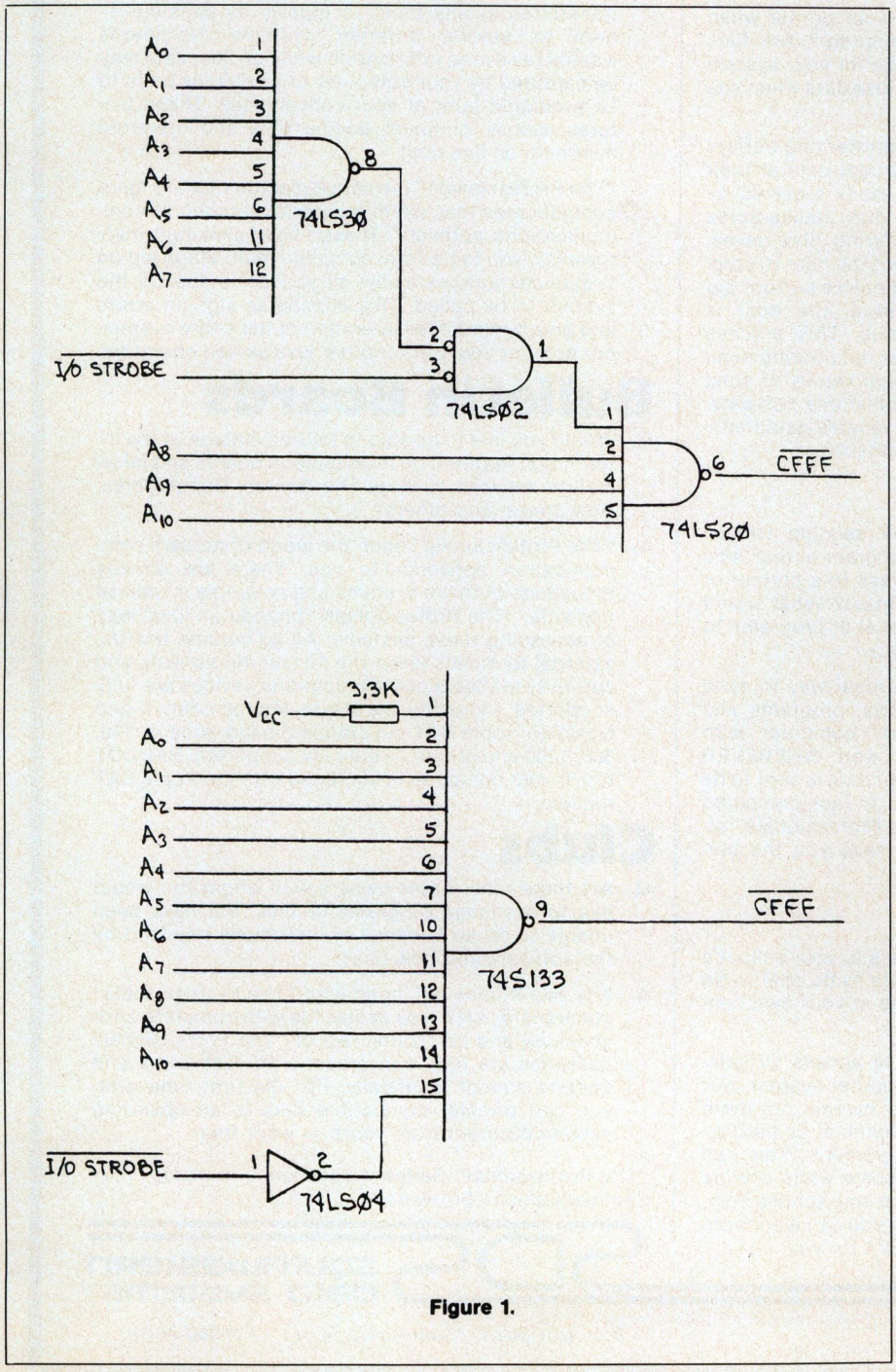

Figure 1.

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ROASTING APPLESOFT PRESERVES

David G. Sparks

THAT Val Golding! He will do anything to promote others' learning about the Apple computer! He reminds me of the great hillbilly guitarist Chet Atkins, who once astonished the audience of Boston Pops with his virtuoso performances of classical and baroque literature on his instrument.

After one particularly brilliant piece, he drawled, "Most folks come to concerts hoping to hear the artist make a mistake. I threw a few in so they wouldn't be disappointed."

I think that Val did this with his recent article, "Applesoft Preserves." He deliberately injected a few mistakes just to keep our attention.

The sharp-eyed veterans out there no doubt glanced over the source code, saw the error, and called to chuckle at his little jest. On the other hand, we who take our machine language listings on faith had to type it in, assemble, and sit puzzling at one or two intermittent bugs.

Sometimes one or more string variables would vanish. Applesoft could go off into garbage collection prematurely. Worst of all, part of the program might have been overwritten by data!

Sooner or later, a few of us might call on the hot line for help. That's what Val waited for.

"Yes, there's something wrong. No, I haven't looked at it. Someone told me that one or two of the pointers might be off the mark."

Then the sneak attack of the best kind of teacher, "Why don't you see if you can fix it for me. I'd do it myself, but I'm too busy. Why, you are caller number 10,087 since six o'clock tonight, and I still have lots of things to do. You can fix it, it's not that difficult."

Can I? Let's see....

The program has three parts. The code is relocatable, so you can BLOAD it anywhere. It is intended to use the ampersand (&), therfore you must set up the so-called ampersand vector.

Assuming you entered the code into the addresses given in the February '82 article, you will want to do one of two things. Either POKE 1013,76:POKE 1014,0:POKE 1015,3 or enter the monitor with CALL -151 then type 3F5:4C 00 03 [return] 3DOG [return].

You have just told Applesoft where to find your routine, in this case, at hex address $300. When Applesoft encounters an "&" character, whether in a program or typed by you, it will think you typed CALL 768, and act accordingly.

So much for the ampersand. Now for the bug of instruction that Val put in the program for us. Actually, two, or three, depending on how you count.

Bug number one is the worst. Open the February issue to page 66. Look at line number 73. It says, "324: 95 6A 73 STEP STA VARPNT +1,X-2." It seems to be telling the 6502 to subtract 2 from the value in the X-register, and use the result to count from location $6A to the spot where the accumulator's value should be stored.

Look at the line above. It's a clear-cut instruction to load the X-register with 6.

So line 73 wants the 6502 to subtract 2, leaving 4 in the X-register, then count from 0 to 4, starting at $6A and store the value in the accumulator at $6E.

What is $6E? According to the Applesoft manual, it is part of the address of the top of numeric variable storage, the last of three pointers to the variable storage area. The accumulator contains a modification to that address, and two others, which are the keys to the successful function of the program.

Enter the monitor again, after BLOADing this program, and list the actual code with the command 324L [return]. Look at the top line. It reads, "STA $6A,X." There is no mention of subtracting 2 from the X-register at that point. Why?

The 6502 microporcessor has no way to do that. How did the Big Mac assembler permit the funny operand in line 73 to go by without flagging an error? Good question.

It teaches a lesson similar to the one they tell people who take flying lessons: the pilot, not the machine, is responsible at all times for the safe operation of the flight.

What does this bug do? With 6 in the X-register, it updates a fourth address, at $70. This address tells Applesoft where to put string data. Applesoft wants strings to go up above the other variables, but the bug has just told it to put them below the other variables. This may cause garbage collection. It may do other things.

Why doesn't the bug wreck everything? Because the loop which starts at line 73 actually does go on to subtract 2 from X, store the accumulator in the correct address, and continue in this way until it is finished. The other variable pointers are properly changed, and if you do not use string variables, you should have no problems.

The fix? Easy. Change line 72 to load the X-register with a 4, instead of a 6. The program will now leave alone the address of the start of string storage.

You may want to tidy up the source code at line 73, by removing the "-2" from the operand.

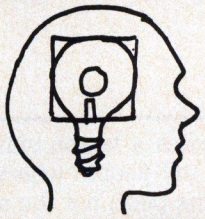
Bug number 2 is in the macro, CKDATA. Again, it has to do with the value of the X-register. Defined in line 49, and implemented at locations $33A and $34E, X receives another 6. It should be 7. Here's why.

Unlike the initialization part of Applesoft Preserves, the &STORE DATA and &RECALL DATA parts do need to deal with the start of string pointers. They must handle both bytes of all four variable pointers. Since the 6502 always starts counting from 0, handling eight bytes requires counting down from 7 to 0.

The way the program was published, it wasn't saving the high byte of the start of string pointers, again introducing unpredictable results into any program dealing with string variables.

Fix the code by changing line 49 to load X with 7, instead of 6. Delete the extraneous LDX instruction at line 97. Then re-assemble, and let *Mac* take care of everything.

ATTENTION
SOFTWARE AUTHORS



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ROASTING APPLESOFT

Note again the attempt at X-register arithmetic in lines 86, 87, 98, and 99. Take out offending "-1" characters if you wish. Big Mac will apparently ignore them, and assemble a normal, indexed-by-X opcode there. With a 7 in the X-register at the start of the two loops, all four addresses will be preserved.

If you entered the code by hand, here are all of the fixes discussed in the article thus far. Enter the monitor with CALL -151, then:

BLOAD Applesoft Preserves
(Yes, you can use DOS while in the monitor. Don't worry about the funny bytes that show up on the screen when you do.)
323:04 [return] fixes first bug.
33B:07 [return] fixes bug #2 in the &STORE DATA part.
34F:07 EA EA [return] fixes bug #2 in the &RECALL DATA part, and puts "do-nothing" code over the extra line.
BSAVE Applesoft Preserves, A768,L100 [return]

And that'll do it! Good for another 100,000 miles!

Now to turn again to the subject of Val Golding. Val *knows* all this stuff. He certainly knows that the 6502 has no facility for direct arithmetic manipulation of the X-register during an indexing operation.

There had to be a reason why he would deliberately publish a program with such sneaky bugs in it. I believe it was to force rookie types like me to learn by debugging. It was effective. That must be it.

I mean, what other explanation could there be?

Editors note: Wouldn't you know — always someone to get us off the hook!

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PRINT TO DISK

Vince Giambalvo

HAVE you ever wanted to get the output of your word processor or assembler listing onto a disk file instead of your printer? If not, take a moment to consider the possibilities: editing for page breaks, adding page numbers, printing in multiple columns, and more.

Many operating systems have the ability to redirect output, and the Apple does also – via the PR# command. Unfortunately this cannot be used to direct output to a disk file, since PR#: "filename" doesn't work. If you are writing a BASIC program the problem is easy to solve. But many commercial programs, including *Big Mac,* the marvelous macro assembler from *A.P.P.L.E.* and most word processors do not have this capability. What is needed is a driver routine to divert the output from the printer to a DOS textfile.

PRINT TO DISK is a program to do this. It was originally developed to take the assembly listing from Big Mac and store it on a disk so it could be printed in double columns. It was then adapted for use with other programs. The requirements on the program to be used with PRINT TO DISK are simple. First, it must allow a RAM print driver (usually at $300). Second, it must not access the disk during the print. Third, it must be able to send a unique character at the end to terminate the print and close the file. These requirements are satisfied by Big Mac and by Programma's *Apple Pie* text processor FORMAT. PRINT TO DISK also requires a 48K Apple and DOS 3.3., but can be used on other systems by changing a few equates.

The source code in listing 1 is for the Big Mac assembler. The conditional assembly feature of Big Mac allows two programs to be contained in one source file, controlled by the switch]MAC in line 12. Changing line 12 to]MAC EQU 1 will set up the code to work with Big Mac. The switch is set to zero so that readers who do not yet have Big Mac can just type in the machine code. Those with Mac will want to assemble both versions, and save them to disk, perhaps as PRINT TO DISK and PRINT TO DISK (MAC). The use of each version will be described separately.

To store an assembly listing to disk, first BRUN Big Mac, then do a catalog and BRUN PRINT TO DISK (MAC). This will set up Mac's USER entry, which is Applesoft's & vector. Then load your favorite source file. From the editor enter USER. The disk will spin, and you will be returned to the editor. Then enter ASM and answer N to the EDIT SOURCE prompt. The source listing will be displayed on the screen while it is being written to a disk textfile with the name "fn.L," where fn is the name of your source file. When assembly is finished, the file is closed and will be ready for other uses.

Notes:

1. The PAG statement should not be used. It will cause the disk file to be closed prematurely, as PRINT TO DISK (Mac) uses a formfeed (CTRL L) as a terminating character. This is automatically sent by Big Mac at the end of assembly.
2. If you have not loaded a source file, Mac will not have a name and PRINT TO DISK will do nothing.
3. The slot, drive, and volume parameters are not supported. Use the D command in Mac's exec mode to switch drives.

To use PRINT TO DISK with another program, first make sure that the last character to be sent to the "printer" is a Ctrl W. Then load both your program and PRINT TO DISK, let the program know that your print driver is at $300 and run. You may change the data at $34E (846 decimal) if you wish to use an alternate end character. With FORMAT, after inserting a Ctrl W as the last character of the file to be "printed," the sequence of commands would be:

```
BLOAD FORMAT
BLOAD PRINT TO DISK
POKE 2052,3
CALL 2048
```

When ready to "print," you will be prompted for a file name with the prompt "WRITE." A text file will be created with that name. For multiple drive systems, the last accessed drive will be used. The D, S, and V parameters on the filename are supported. If no name is entered, ie., just a carriage return, the disk file will not be created, but the printout will go to the screen.

The operation of PRINT TO DISK is relatively straightforward. The code from lines 60 to 92 is executed the first time a character is sent. The file name is obtained, either from Mac or from the keyboard, the file is opened, and the output vector is set to point to PSO – the real print routine. On subsequent CALLs to the print routine, the characters are displayed on the screen and set to DOS until ENDCHR is detected. Then the file is closed, DOS is disconnected, and PRINT TO DISK disconnects itself. If ENDCHR is received prematurely, the disk file is closed, and the rest of the printout goes directly to the screen.

Modifications of PRINT TO DISK are easy, because of the conditional assembly flags. In addition to]Mac there are two others —]TAB and]GFN.]TAB enables tab (Poke 36) when set to one and]GFN set to one requests the filename from the keyboard. If both]GFN and]TAB are set to one, the program will not fit in the space at $300 and the origin must be changed. It may be difficult to find a suitable origin however. Since there is not much space available, the POKES mentioned above could be incorporated into the program.

With minor modifications it should be possible to use PRINT TO DISK with many programs, thereby increasing their flexibility and thus avoiding one of the limitations of Apple DOS.

PRINT TO DISK

```
                 ********************************
                 *                              *
                 *        Print to Disk         *
                 *                              *
                 *    by  Vince Giambalvo       *
                 *                              *
                 * Call -A.P.P.L.E. : Aug. 1982 *
                 *                              *
                 ********************************
                 *
                 *
                 ]MAC      EQU   0
                           DO    ]MAC
                 ]GFN      EQU   0
                 ]TAB      EQU   1
                 ENDCHR    EQU   $8C          ;Formfeed
                           ELSE
                 ]GFN      EQU   1
                 ]TAB      EQU   0
                 ENDCHR    EQU   $97          ;Ctrl-W
                           FIN
                 *
                 FNBUF     EQU   $1A0         ;Space for filename
                 *
                 * Monitor equates
                 *
                 CH        EQU   $24          ;For tabs
                 COUT      EQU   $FDED        ;Normal output
                 COUT1     EQU   $FDF0        ;Screen output
                 CROUT     EQU   $FD8E        ;Output C/R
                 SETVID    EQU   $FE93        ;PR# 0
                 SETKEY    EQU   $FE89        ;IN# 0
                 NXTCHR    EQU   $FD75        ;Keyboard input
                 *
                 * DOS 3.3 48K Equates
                 *
                 CONNECT   EQU   $3EA         ;Reconnect DOS
                 WRTCODE   EQU   $A91F        ;Write parameters
                 YSAVE     EQU   $AA5B        ;Save area
                 DOSBUF    EQU   $AA5C
                 DOSWRT    EQU   $A613        ;DOS Write byte
                 *
                           ORG   $300
                 *
                 *
                 * Set ampersand (&) vector if MAC
                 *
                           DO    ]MAC
                           LDA   #<TODISK     ;Set up Mac's
                           STA   $3F6         ;  USER vector
                           LDA   #>TODISK
                           STA   $3F7
                           RTS
                 TODISK    LDA   FNBUF        Check for filename
                           CMP   #$8D         ;Carriage return
                           BNE   SETUP        ;If none, quit
                           RTS
                           FIN
                 *
0300: 8E 78 03   SETUP     STX   XSAVE
                           DO    ]GFN
0303: 20 89 FE   GETFILE   JSR   SETKEY       ;Disconnect DOS
0306: 20 93 FE             JSR   SETVID
0309: A2 02                LDX   #2
030B: 20 79 03             JSR   DOSCALL      ;Get filename
030E: A2 00                LDX   #0
0310: 20 75 FD             JSR   NXTCHR       ;If no name, do nothing
0313: E0 00                CPX   #0
0315: F0 2F                BEQ   OUTH
0317: BD 00 02   MVFN      LDA   $200,X
031A: 9D A0 01             STA   FNBUF,X
031D: CA                   DEX
031E: 10 F7                BPL   MVFN
                           FIN
                 *
0320: 20 EA 03             JSR   CONNECT      ;Reconnect DOS
```

```
0323: CE 1F A9   77              DEC  WRTCODE      ;Allow write to work
0326: A9 76      78              LDA  #$76
0328: 8D 20 A9   79              STA  WRTCODE+1
032B: A2 00      80              LDX  #0           ;Open file
032D: 20 79 03   81              JSR  DOSCALL      ;Set to Write
0330: 20 85 03   82              JSR  PFN
0333: EE 1F A9   83              INC  WRTCODE      ;Restore DOS
0336: A9 06      84              LDA  #$06
0338: 8D 20 A9   85              STA  WRTCODE+1
033B: 20 89 FE   86              JSR  SETKBD       ;Disconnect DOS and
033E: A9 4A      87              LDA  #<PSO
0340: 85 36      88              STA  $36          ; set output vector to
0342: A9 03      89              LDA  #>PSO        ;disk output
0344: 85 37      90              STA  $37
0346: AE 78 03   91   OUTH       LDX  XSAVE
0349: 60         92              RTS
                 93   *
                 94   * Divert print to disk
                 95   *
034A: 8E 78 03   96   PSO         STX  XSAVE
034D: C9 97      97              CMP  #ENDCHR      ;Check for end
034F: F0 15      98              BEQ  CLOSIT
0351: 8C 5B AA   99              STY  YSAVE
0354: 48        100              PHA               ;Save character
0355: 20 F0 FD  101              JSR  COUT1
                102              DO   TTAB
                103   *
                104   * Check for tabs
                105   *
                106   OUTA       LDA  CHCNT
                107              CMP  CH
                108              BCS  NOTAB
                109              LDA  #$A0         ;Print a blank
                110              PHA
                111   NOTAB      PLA               ;Restore character
                112              PHA               ;and stack
                113              STA  DOSBUF       ;Save chr in buffer
                114              AND  #$60
                115              BEQ  OUTB         ;Control character
                116              INC  CHCNT
                117   OUTB       PHP               ;Save tab flag
                118              JSR  DOSWRT
                119              PLP
                120              BCS  NT2
                121              PLA               ;Pull blank off stack
                122              BNE  OUTA         ;Always taken
                123   NT2        PLA
                124              CMP  #$8D
                125              BNE  NTCR
                126              LDA  #0
                127              STA  CHCNT
                128              ELSE
                129   *
0358: 68        130              PLA               ;Get character
0359: 8D 5C AA  131              STA  DOSBUF
035C: 20 13 A6  132              JSR  DOSWRT       ;and write it
                133              FIN
                134   *
035F: AC 5B AA  135   NTCR       LDY  YSAVE
0362: AE 78 03  136              LDX  XSAVE
0365: 60        137              RTS
                138   *
0366: 20 93 FE  139   CLOSIT     JSR  SETVID
0369: 20 EA 03  140              JSR  CONNECT      ;Reconnect DOS
036C: A2 08     141              LDX  #8
036E: 20 79 03  142              JSR  DOSCALL      ;Close file
0371: 20 8E FD  143              JSR  CROUT
0374: AE 78 03  144              LDX  XSAVE
0377: 60        145              RTS
                146   *
0378: 00        147   XSAVE      HEX  00
                148              DO   TTAB
                149   CHCNT      HEX  00
                150              FIN
                151   *
                152   * Subroutine to write msg
                153   *
0379: BD 98 03  154   DOSCALL    LDA  MSG,X
037C: F0 06     155              BEQ  MSGEND
037E: 20 ED FD  156              JSR  COUT
```

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PRINT TO DISK

```
0381: E8              157             INX
0382: D0 F5           158             BNE   DOSCALL
0384: 60              159 MSGEND      RTS
                      160 *
                      161 * Send filename to DOS
                      162 *
0385: A2 00           163 PFN         LDX   #0
0387: BD A0 01        164 PFN1        LDA   FNBUF,X
038A: C9 8D           165             CMP   #$8D
038C: F0 06           166             BEQ   GOTCR
038E: 20 ED FD        167             JSR   COUT
0391: E8              168             INX
0392: D0 F3           169             BNE   PFN1 :Always taken
                      170 GOTCR       EQU   *
                      171             DO    IMAC
                      172 *
                      173 * Append a ".L" to filename for Mac
                      174 *
                      175             LDA   #"."
                      176             JSR   COUT
                      177             LDA   #"L"
                      178             JSR   COUT
                      179             FIN
                      180 *
0394: 20 8E FD        181             JSR   CROUT
0397: 60              182             RTS
                      183 *
0398: 8D 84           184 MSG         HEX   8D84 :C/R and Ctrl-D
039A: D7 D2 C9
039D: D4 C5           185             ASC   "WRITE"
039F: 00 8D 84        186             HEX   008D84
03A2: C3 CC CF
03A5: D3 C5           187             ASC   "CLOSE"
03A7: 00              188             HEX   00
--End assembly--          168 bytes       Errors: 0
```


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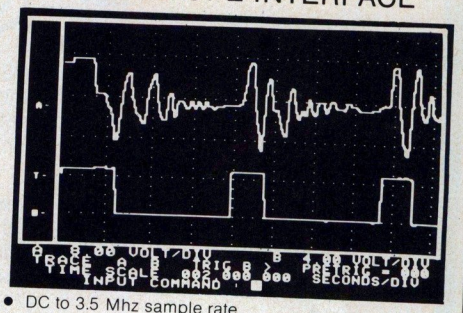

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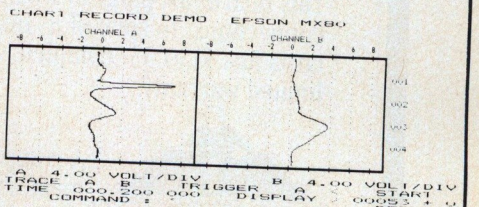

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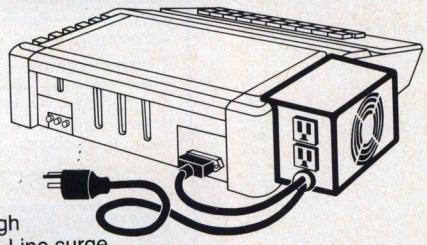

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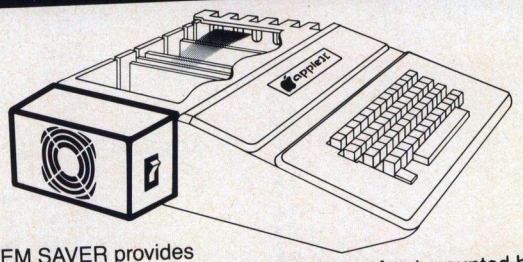

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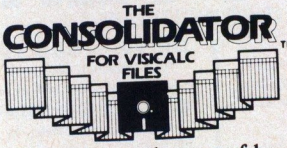

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SQUASHING A NASTY DOS BUG

Art Schumer

HERE'S another bug in DOS that has been around since its conception back in 1978 with DOS 3.0 and has been carried through to the present version, DOS 3.3. It rarely surfaces due, in part, to mostly recent use of extremely large text files in data base programs.

The bug arises when a program uses the APPEND command on a sequential file, where the relative record number is larger than 32767 ($7FFF in hex). This is distinct from the term record, defined as a group of characters terminated by a carriage return. With the sequential file, the user most of the time is not concerned with the particular record number, but DOS keeps track of it internally. When this number becomes greater than 32767, and DOS is required to do an automatic POSITION, it performs the calculation incorrectly.

During the execution of the APPEND function, DOS will open the file for access and read each consecutive byte of the file (an extremely slow and inefficient method!) until it encounters an End of Data (EOD) null, a hex "0." It will then jump to the POSITION routine to set things up so that the next Write command will place data over the original End Of Data mark, and will add a new EOD mark to indicate the end of this longer file.

This bug is in the Calculate Position routine, and on record numbers greater than 32767, it will not position *on* the EOD mark, but one byte *past.* In effect, whatever new data is appended to that file will never be able to be accessed, as it is actually written *after,* not *over* the EOD mark!

The program in listing 1 — using the APPEND command to create a large sequential file — will cause this problem. It first Opens the file and then performs five APPENDs to write out 5000 lines of text in 1000 line groups. Since each line (or record, if you prefer) is 16 bytes long, the program creates a text file with 80,000 characters in it (approximately 316 sectors in length). After each of the five APPENDs, you will be presented with a Catalog of the disk to see the progression in the size of the text file. You may observe that the size of the file increases from 64 to 127, to 190, to 254 and then to 254?? During the fifth APPEND, the size of the file should have increased. Instead it remained the same, signifying to us that something happened with our last group of lines. Our *bug* came out of hiding!

LISTING 1

```
10  REM
Program to create APPEND erro
60 D$ =  CHR$ (4)
70 N = 999
80  TEXT : HOME
90  PRINT D$"OPEN ATEST"
100  FOR J = 1 TO 5
110  PRINT "PASS ";J
120  PRINT D$;"APPEND ATEST"
130  PRINT D$;"WRITE ATEST"
140  FOR I = 1 TO 1000
150 N = N + 1
160  PRINT "NEW LINE - ";N
170  NEXT I
180  PRINT D$;"CLOSE ATEST"
190  PRINT D$;"CATALOG": PRIN
200  NEXT J: END
```

After its creation, a scan of the file with a disk access utility program will yield the 189th ($BD hex) sector of the file showing the problem (see the sector dump in listing 2). Note that byte 128 ($80 hex) is an EOD mark (a "0") and that our data follows this mark. Any program trying to read data past that EOD mark will give an "END OF DATA" error.

LISTING 2

```
------------- DISKFIXER -------------
TRACK $1F/SECTOR $01/VOLUME $00/BYTE $00
-------------------------------------
$00   CEC5D7A0CCC9CEC5A0ADA0B3B9B9B28D
$10   CEC5D7A0CCC9CEC5A0ADA0B3B9B9B38D
$20   CEC5D7A0CCC9CEC5A0ADA0B3B9B9B48D
$30   CEC5D7A0CCC9CEC5A0ADA0B3B9B9B58D
$40   CEC5D7A0CCC9CEC5A0ADA0B3B9B9B68D
$50   CEC5D7A0CCC9CEC5A0ADA0B3B9B9B78D
$60   CEC5D7A0CCC9CEC5A0ADA0B3B9B9B88D
$70   CEC5D7A0CCC9CEC5A0ADA0B3B9B9B98D
$80   00CEC5D7A0CCC9CEC5A0ADA0B4B0B0B0
$90   8DCEC5D7A0CCC9CEC5A0ADA0B4B0B0B1
$A0   8DCEC5D7A0CCC9CEC5A0ADA0B4B0B0B2
$B0   8DCEC5D7A0CCC9CEC5A0ADA0B4B0B0B3
$C0   8DCEC5D7A0CCC9CEC5A0ADA0B4B0B0B4
$D0   8DCEC5D7A0CCC9CEC5A0ADA0B4B0B0B5
$E0   8DCEC5D7A0CCC9CEC5A0ADA0B4B0B0B6
$F0   8DCEC5D7A0CCC9CEC5A0ADA0B4B0B0B7
-------------------------------------
B0/ATEST AT $42
(16-SECTOR/L)                FILTER ON
->P                                  #
```

```
------------- DISKFIXER -------------
TRACK $1F/SECTOR $01/VOLUME $00/BYTE $00
-------------------------------------
$00  >N<E W   L I N E   -   3 9 9 2 _
$10   N E W   L I N E   -   3 9 9 3 _
$20   N E W   L I N E   -   3 9 9 4 _
$30   N E W   L I N E   -   3 9 9 5 _
$40   N E W   L I N E   -   3 9 9 6 _
$50   N E W   L I N E   -   3 9 9 7 _
$60   N E W   L I N E   -   3 9 9 8 _
$70   N E W   L I N E   -   3 9 9 9 _
$80   _ N E W   L I N E   -   4 0 0 0
$90   _ N E W   L I N E   -   4 0 0 1
$A0   _ N E W   L I N E   -   4 0 0 2
$B0   _ N E W   L I N E   -   4 0 0 3
$C0   _ N E W   L I N E   -   4 0 0 4
$D0   _ N E W   L I N E   -   4 0 0 5
$E0   _ N E W   L I N E   -   4 0 0 6
$F0   _ N E W   L I N E   -   4 0 0 7
-------------------------------------
B0/ATEST AT $42
(16-SECTOR/L)                FILTER ON
->P                                  #
```

SQUASHING A NASTY DOS BUG

Now that we've seen the problem, let's analyze the POSITION routine to see why it won't calculate correctly on large files with record numbers greater than 32767.

The Calculate Position routine resides in the DOS File Manager from location $B300 through $B35E. Its job is to calculate the offset into the current data sector and for the next data Read or Write. It accomplishes this by doing a three byte multiply of the record number (located at $B5EA-$B5EB) with the record length (located at $B5E8-$B5E9), and storing the result in the three byte file position offset (located at $B5E4-$B5E6). The value left at $B5E6 is picked up by the next Read or Write command and used to index that information in the data sector for storage or retrieval.

I disassembled the Calculate Position routine in the Apple DOS File Manager and used it in a test program to help me find the error. By supplying sample record numbers, subsequently calling the Calculate Position routine, and printing out the record number and offset into the sector, I was able to verify that the error occurred when the record number changed from $7FFF to $8000. In listing 3, the results are printed out. You can see that the position offset next to record $8000 is $01 and it should be $00.

LISTING 3

```
:MGO START
OFFSET — RECORD NUMBER
.....

$FD     $7FFD
$FE     $7FFE
$FF     $7FFF
$01     $8000
$02     $8001
$03     $8002
$04     $8003
:
```

After a brief examination of the code, I was able to spot the error. One of the Golden Rules in assembly language programming is to *always* clear the carry flag before addition is performed. In my test program (not listed), a series of additions are to be performed and no CLC instruction executed prior! Before this addition code is the three byte multiply code, and simply stated — without getting into how a three byte multiply works — this routine in DOS will leave the carry flag clear after a multiplication of a record number less than 32767 and the carry flag set after a record number greater than 32767. This explains the incorrect calculation on larger files and not on smaller ones. The addition code following the three byte multiply code will use the carry flag in its calculation — and on large records, will add one to the final resultant file offset.

To illustrate why one needs to clear the carry flag before any addition is performed, look at the following simple example.

```
  23¹ ← a carry before the addition
+ 18    begins
-----
  42  ← instead of 41
```

We can see that if we have a carry before we even start the addition, the result will be one too many. It is therefore imperative that we start all additions with the carry cleared.

By inserting a CLC instruction into my sample program, and running the test over again, I got the results shown in listing 4. A correct calculation finally!

LISTING 4

```
:MGO START
OFFSET — RECORD NUMBER
.....

$FD     $7FFD
$FE     $7FFE
$FF     $7FFF
$00     $8000
$01     $8001
$02     $8002
$03     $8003
:
```

The fix, therefore, is to add a CLC instruction prior to the addition code. I had originally written a patch that would go in the $B600 area where there already exists three APPEND routine and a Verify routine patch. However, in the interim, Val Golding forwarded to me a patch by Erv Edge, to whom I am grateful, and it fit nicely in the original Calculate Position routine. Erv takes the 33 bytes of codes which start at $B33E, inserts a CLC to correct the problem, then re-arranges the remaining code. Listing 6A shows that portion of the original code starting at $B33E, while listing 6B shows the complete Calculate Position Routine from $B300 through B35E.

By again running the same program used earlier to create an APPEND error and dumping out the same sector, we can verify that we are now writing over the EOD mark correctly and that the sector count is increasing correctly from 64 to 127, to 190, to 253, and finally to 60?? It now seems that the sector count has dropped during the last APPEND. Another possible error? Not really. By examination of the sector count of our file in the directory with a disk access utility program, one can see that the value stored there is $13C (316 decimal). Why, then, doesn't a Catalog show this correctly?

Apparently the original designers of DOS never expected to have files larger than 255 sectors, and the Decimal Convert routine in DOS (located at $A1D6) will only work up to that limit. It drops the high byte of the sector count and just uses the low byte in its conversion. The low byte hex value $3C translates into 60 decimal and there's our answer! This is another problem to fix, but not as easy as the one just made. The entire Decimal Convert routine would have to be re-written. Perhaps this could be the basis for a future article.

A copy of this article has been sent to Apple Computer Inc. so that hopefully future issues of DOS will incorporate this patch.

With the length of time taken for this bug to show up, one has to wonder how many more are out there just waiting to be discovered!

LISTING 5A BEFORE

```
B33E: AD BF B5   29          LDA  $B5BF
B341: 8D EC B5   30          STA  $B5EC
B344: 6D E6 B5   31          ADC  $B5E6
B347: 8D E6 B5   32          STA  $B5E6
B34A: AD C0 B5   33          LDA  $B5C0
B34D: 8D ED B5   34          STA  $B5ED
B350: 6D E4 B5   35          ADC  $B5E4
B353: 8D E4 B5   36          STA  $B5E4
B356: A9 00      37          LDA  #$00
B358: 6D E5 B5   38          ADC  $B5E5
B35B: 8D E5 B5   39          STA  $B5E5
B35E: 60         40          RTS
                 41
```

LISTING 5B AFTER

```
                        ORG   $B300
B300: AD BD B5          LDA   $B5BD
B303: 8D E6 B5          STA   $B5E6
B306: 8D EA B5          STA   $B5EA
B309: AD BE B5          LDA   $B5BE
B30C: 8D E4 B5          STA   $B5E4
B30F: 8D EB B5          STA   $B5EB
B312: A9 00             LDA   #$00
B314: 8D E5 B5          STA   $B5E5
B317: A0 10             LDY   #$10
B319: AA        LB319   TAX
B31A: AD E6 B5          LDA   $B5E6
B31D: 4A                LSR
B31E: B0 03             BCS   LB323
B320: 8A                TXA
B321: 90 0E             BCC   LB331
B323: 18        LB323   CLC
B324: AD E5 B5          LDA   $B5E5
B327: 6D E8 B5          ADC   $B5E8
B32A: 8D E5 B5          STA   $B5E5
B32D: 8A                TXA
B32E: 6D E9 B5          ADC   $B5E9
B331: 6A        LB331   ROR
B332: 6E E5 B5          ROR   $B5E5
B335: 6E E4 B5          ROR   $B5E4
B338: 6E E6 B5          ROR   $B5E6
B33B: 88                DEY
B33C: D0 DB             BNE   LB319
B33E: 18                CLC
B33F: AD BF B5          LDA   $B5BF
B342: 8D EC B5          STA   $B5EC
B345: 6D E6 B5          ADC   $B5E6
B348: 8D E6 B5          STA   $B5E6
B34B: AD C0 B5          LDA   $B5C0
B34E: 8D ED B5          STA   $B5ED
B351: 6D E4 B5          ADC   $B5E4
B354: 8D E4 B5          STA   $B5E4
B357: 90 03             BCC   LB35C
B359: EE E5 B5          INC   $B5E5
B35C: 60        LB35C   RTS
```


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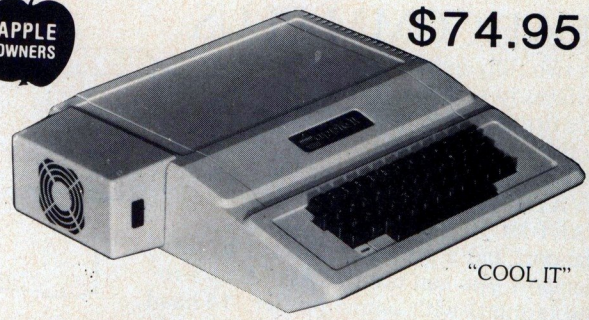

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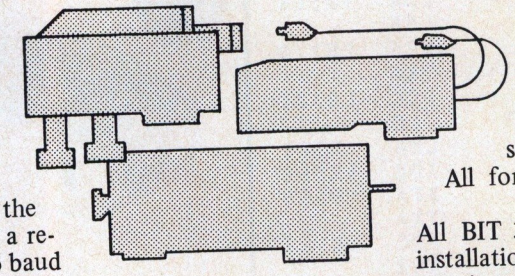

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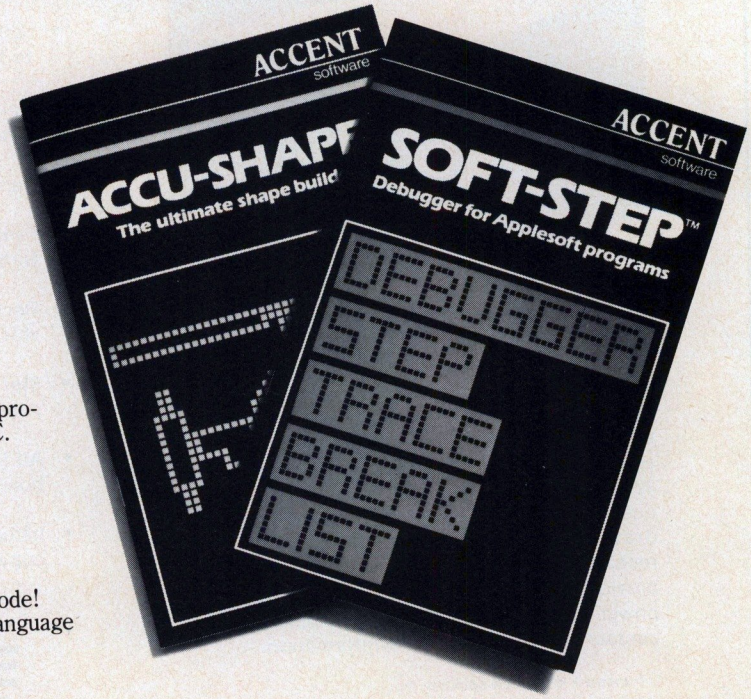

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DOING THE SPLITS

Roy Myers

I was recently developing a rather long Applesoft program which used high resolution graphics. When the program became too large to fit below page 1 of high resolution graphics, I changed all of my HGR statements to HGR2, and continued. Eventually the program would not fit below page 2 of graphics. Then I relocated the program. This can be done by using memory locations 103 and 104 ($67 and $68). Applesoft uses these locations as a pointer (usually referred to as TEXTTAB) to the beginning of the Applesoft program. Location 104 contains the high byte and location 103 contains the low byte of the address. Usually location 103 contains a 1 and location 104 contains an 8. TEXTTAB then points at $801 (decimal 2049). The byte just before the beginning of the program (location 2048), must contain 0, which is used as a beginning-of-program code.

We can use TEXTTAB to identify the memory location at which we want an Applesoft program to begin. For example, we can arrange for a program to begin above high resolution graphics page 1. Since 64 has hex value $40, if we type:

```
POKE 103,1: POKE 104,64
```

we change TEXTTAB so that it points at $4001. Then we must set $4000 to 0 (the beginning-of-program code), which is done by

```
POKE 16384,0
```

(16384 is the decimal representation of $4000.) If we now type NEW, then type in an Applesoft program, or load it from disk, the program will be located above high resolution graphics page 1.

Back to my program. Since it had to run at location $4001, I arranged to have the first line of the program handle the bookkeeping:

```
1 IF PEEK (103) < > 1 OR PEEK
  (104) < > 64 OR PEEK (16384)
  < > 0 THEN POKE 103,1: POKE
  104,64: POKE 16384,0: PRINT
  CHR$ (4);"RUN PROGRAM"
```

This way the program effectively relocated itself.

The program increased in length. It also supported several large arrays. Despite the use of all the space-saving tricks I knew, I still needed additional space. I looked longingly at the 6100 bytes of memory between $800 and $2000. This area is usually used for Applesoft programs, but was currently going unused. I had read of techniques which allowed a program to be split into two parts, with one part on either side of the graphics page. While considering the use of one of those methods, I developed an alternative.

In this article I will explain an easy way to store large program blocks as subroutines, placing them on the opposite side of the graphics page from the main program.

The key to the technique lies in the use of TEXTTAB and a second pointer, called TXTPTR, which is in locations 184, 185 ($B8, $B9). As it works through a program, the Applesoft routine CHARGET reads the character or token pointed to by TXTPTR, interprets it and takes the indicated action, then increases the contents of TXTPTR by one in order to read the next character or token.

For example, suppose that memory locations $810 and $811 contain the numbers 145 ($91) and 58 ($3A) respectively. When 184 contains $10 and 185 contains $08, then TXTPTR is pointing at $810. CHARGET will read the contents of $810, obtaining 145 ($91), interpret this as the token for the keyword "HGR" (see Applesoft BASIC Reference Manual, p.121), and take the appropriate actions. Next the contents of TXTPTR are incremented by one. 184 will contain $11 and 185 will contain $08, so that TXTPTR is pointing at $811. CHARGET reads the contents of $811, obtaining 58 ($3A), and interprets this as ":" (see Applesoft Basic Reference Manual, p. 138). The process continues.

In this way, CHARGET steps its way through the program. For a technical explanation of Applesoft's CHARGET routine, see *Call -A.P.P.L.E.*, March, 1982. If a GOSUB is encountered, the current value of TXTPTR is saved on the stack, and TXTPTR is given a new value, causing it to point to the beginning of the subroutine. When a RETURN is encountered, TXTPTR takes back the value that had been stored on the stack, and control is returned to the main program.

When looking for the program line which is the object of a GOSUB, Applesoft has two ways of searching. If the high order byte of the line number which is the object of the GOSUB is smaller than or equal to the high order byte of the number of the line which calls the subroutine, then Applesoft uses TEXTTAB as a base reference when seeking the subroutine. This means that the search begins at the beginning of the program, since this is where TEXTTAB is usually pointing. By changing the value of TEXTTAB, we can direct the search to a specific area of memory.

If the high order byte of the line number of the subroutine is larger than the high order byte of the number of the line which calls the subroutine, then the search does not begin at the location identified by TEXTTAB, but rather at the current program line. In this case a change in TEXTTAB is of no avail.

To illustrate, let's say that we have the following line in a program.

```
280 GOSUB 450
```

The line number of the calling program line (280) has hex value $0118, and the destination line number (450) has hex value $01C2. Since the high order bytes agree, the search for the subroutine will begin at the beginning of the program, as identified by TEXTTAB.

DOING THE SPLITS

For comparison, consider the following example.

```
280 GOSUB 840
```

In this case the destination line number (840) has hex value $0348. Since the high order byte ($03) is larger than the high order byte ($01) of the calling line number, the search for line 840 will begin at the present line.

As a consequence of the way Applesoft searches for subroutines, we can use a subroutine which is stored on the opposite side of a high resolution graphics page from the main program if we:

a) always GOSUB to a lower line number, and
b) use TEXTTAB to control the location at which subroutine searches begin.

As an illustration, try the following:

1. Turn on your Apple. Type FP, then NEW. At this point, TEXTTAB should be pointing at $801. If you want to confirm this, type

```
PRINT PEEK(104),PEEK(103)
```

The response should be:

```
 8          1
```

2. Type the short SUBROUTINE program.

```
10 PRINT "ARRIVED IN SUBROUTINE"
20 POKE 104,64: RETURN
```

3. Next, in preparation for entering a MAIN program in page two of high resolution graphics, type:

```
POKE 104,64:POKE 16384,0
```

With memory locations 103 and 104 containing 1 and 64 ($01 and $40), respectively, TEXTTAB is now pointing at $4001 (decimal 16385).

4. Next, type NEW, and enter the following MAIN program.

```
10 PRINT "IN MAIN PROGRAM NOW"
20 POKE 104,8: GOSUB 10
30 PRINT "BACK IN MAIN"
```

If you want to see that everything is in place, type **POKE 104,8;** then LIST, to see the SUBROUTINE program (LIST uses TEXTTAB too!). Next type **POKE 104,64**; then LIST to see the MAIN program.

5. With memory location 104 containing 64 and memory location 103 containing 1 (TEXTTAB pointing at $4001), RUN the MAIN program. When line 10 is executed and Applesoft comes to line 20, the contents of memory location 104 are changed to 8 (now TEXTTAB points to $0801). The GOSUB causes a search for line 10. Since the subroutine line number is smaller than the line number of the calling line, the search is started at the reference location provided by TEXTTAB ($801). The search ends quickly. After line 10 of SUBROUTINE is executed, line 20 will change the contents of 104 to 64 ($40), causing TEXTTAB to point to $4001. The RETURN then returns control to the MAIN program, which continues with the execution of line 30.

The method described above is easily adapted to allow placement of program and subroutine wherever you like.

Note 1. To return to the MAIN program, all we really need is RETURN. Applesoft will then load TXTPTR from the stack, and continue from the point the GOSUB was found. However, any GOSUB's (or GOTO's) encountered later in the program may cause Applesoft to seek line numbers within SUBROUTINE rather than MAIN. **POKE 104,64** will reset TEXTTAB to the beginning of MAIN.

Note 2: Notice that no difficulty is created if line numbers of SUBROUTINE duplicate those of MAIN, so long as TEXTTAB is reset.

USAGE

To make all of this transparent to the user of your program, you could:

1. With memory locations 103 and 104 containing 1 and 8 respectively (normal contents) type in the SUBROUTINE program, or load it from disk.
2. Save the SUBROUTINE program as a binary file. To do this, calculate the length of the file using the fact that memory locations 175 and 176 contain a pointer to the end of the Applesoft program. The decimal value of the length of the program can be obtained by the immediate execution command

```
PRINT PEEK(175) + 256* PEEK(176)
.2048
```

For SUBROUTINE as defined above, I find the length to be 47. We can then:

```
BSAVE SUBROUTINE, A2048,L47
```

3. Have MAIN relocate itself in the second graphics page. Simply add program line one as defined earlier in this article.
4. Have MAIN load the SUBROUTINE:

```
2 PRINT CHR$(4); "BLOAD SUBROUTINE"
```

As an alternative to the above, you could have an EXEC file handle the bookkeeping.

Note 3: If SUBROUTINE is to be BLOADed as suggested above, it is necessary that it be BSAVEd from the area of memory in which it will be used.

Note 4: We change only TEXTTAB. Variable, array, and string storage are not affected.

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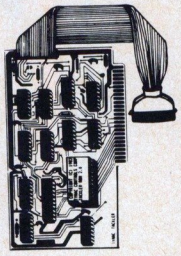

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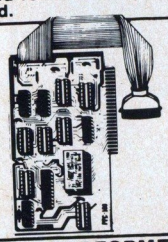

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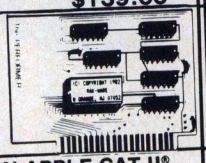

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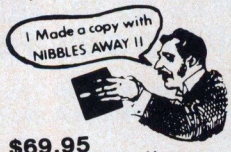

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Note 5: We have here an alternative to CHAINing. If chained programs have large blocks of common code, the dissimilar portions can be consecutively BLOADed and called as subroutines (as we did with SUBROUTINE).

Note 6: It is, of course, possible to have MAIN begin at $801, with SUBROUTINE starting at $4001; and other locations can be used as well. The configuration of memory is up to the program designer.

So far I have focused on methods of controlling the effects of two ponters: TEXTTAB and TXTPTR. There is one other pointer with which you should become familiar. It is PRGEND, which points to the end of the current Applesoft program. Another pointer, named VARTAB, usually points to the same address as PRGEND. (The name VARTAB comes from the fact that the variable table usually comes right after the Applesoft program.) If VARTAB is changed with the LOMEM command, PRGEND continues to point to the end of the program. PRGEND is in locations 175 and 176 and VARTAB in locations 105 and 106. PRGEND was used earlier in describing how to save SUBROUTINE as a binary file.

When you type NEW to enter a new program, the value of PRGEND is set to TEXTTAB + 3. As new program lines are added, PRGEND is increased so that it always points to the end of the program. When the Applesoft line input routine processes a new or edited line it will (among other activities) make room for this line. After the proper memory position has been determined (the line number determines the position relative to all other program lines), the part of the program beyond this point must be moved upward in memory to leave space for the new line. This "moving upward" applies to all program code from the intended memory location of the new line all the way to the end of the program, as identified by PRGEND.

To see why PRGEND is important to us at this time, consider the following scenario: You have entered SUBROUTINE, then MAIN using the procedure described above. Then you decide to add the following program line to SUBROUTINE:

```
15 PRINT "GOING BACK TO MAIN"
```

To do so, you type POKE 104,8, then list the subroutine. Enter the new line, then list again to see that your typing is correct. Next type POKE 104,64 and LIST, to see MAIN... nothing but garbage! Why? Because PRGEND was pointing to the end of MAIN, which along with a lot of other memory contents, was moved upward to make room for the new program line. The beginning of MAIN is no longer at $4001.

Of course you can retype MAIN, or load it from disk (don't forget to POKE 16384,0). The problem is easily dealt with if you see what is happening.

Let's consider another scenario. First enter MAIN, starting at location $4001:

Type:

```
POKE 104,64:POKE 103,1:POKE 16384,0
```

Then type NEW and enter the program.

Now enter SUBROUTINE: First

```
POKE 104,8:POKE 2048,0
```

Then NEW, and type the subroutine program. Now back to MAIN:

```
POKE 104,64.
```

LIST to be sure all is well. Entering the subroutine didn't affect MAIN, since PRGEND was pointing to the end of the SUBROUTINE (NEW did that), and not to the end of MAIN.

RUN the program. It works as expected, so you can save it on disk. You type:

```
SAVE MAIN
```

What happens? Hint: PRGEND is still pointing at the end of SUBROUTINE, which is at a lower memory address than the beginning of MAIN.

When executing the SAVE, DOS tried to save all the memory contents from the beginning of MAIN (identified by TEXTTAB) upward, as far as PRGEND indicates. Surprise! PRGEND is not pointing above TEXTTAB, but below.

Moral: While some problems can arise when writing programs on both sides of the graphics pages, you can avoid them (or at least explain them) if you keep track of PRGEND.

About Roy Myers. . .

Roy Myers is Associate Professor of Mathematics at Penn State, and uses Apple graphics to enhance his calculus class. He is the author of Microcomputer Graphics, recently published by Addison-Wesley. The book provides an introduction to the methods of computer graphics, using the Apple][for all examples. This is his first, but we hope not last, contribution to Call -A.P.P.L.E.

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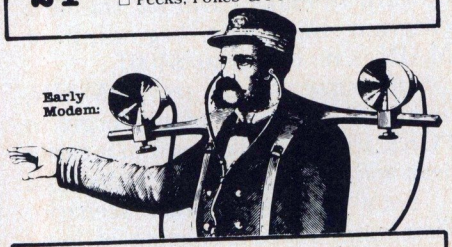

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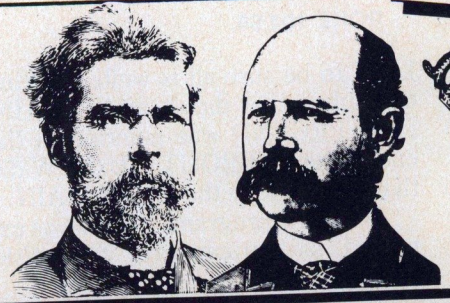

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A Call —A.P.P.L.E. CONTEST...

SO WHAT DID YOU EXPECT?

NO doubt our readers have become aware of the increasing number of contributions published in our "So What Did You Expect" department, so we thought: what better than to award a prize for the best. The So What items we have published to date have been popular and have spurred many additional contributions, thus we would like to acquaint submitters with the So What concept and also familiarize them with the requirements.

The underlying raison d'etre, as with much of what we publish, is to make the reader think, to turn the mind to productive programming directions by analyzing what the program does, and how it does it. Effective with the August *Call -A.P.P.L.E.*, we will pay $10 for each published contribution to the *So What Did You Expect Department.* We anticipate a program with some humorous aspects and which embodies some element of "trickery," although neither is a requirement. Potential submitters can get the best idea of what we are looking for by researching those items previously published.

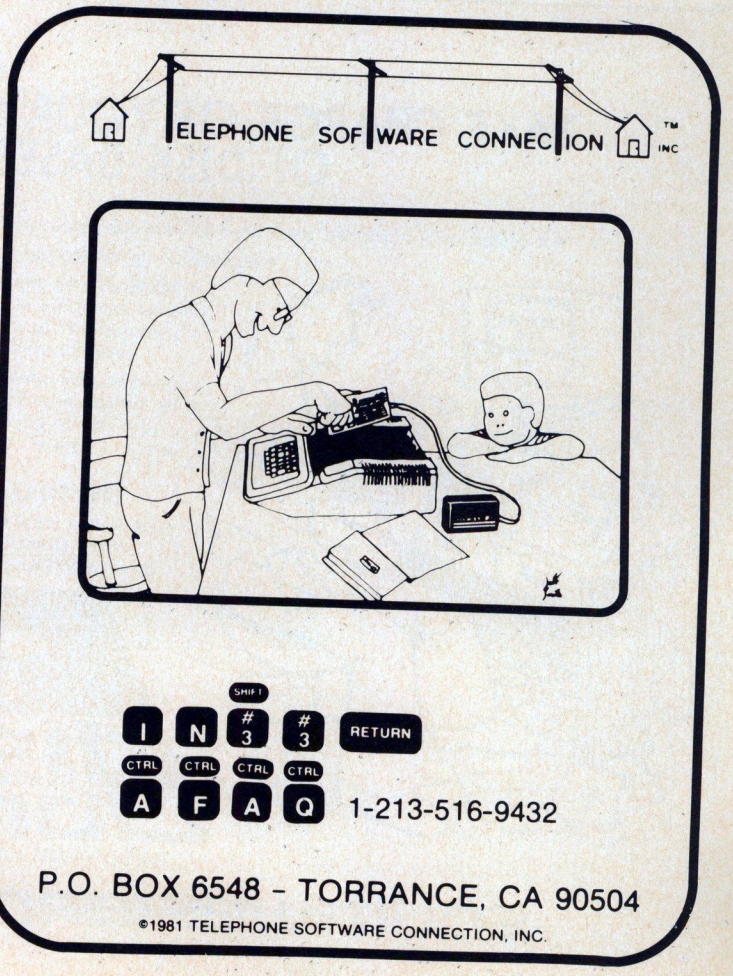
Formal rules for the contest will be announced later in the year; a scoring system will be established, based on originality, uniqueness of application and humorous result. The highest scoring proviso will be the extent to which it causes a reader to stop and think about what makes it tick.

A panel of judges will be selected from among our *members* only. Five judges will be chosen from among the ten earliest applications, based on postmark. Upon completion of voting, each judge will receive his/her choice of one diskette of A.P.P.L.E. software as a measure of thanks from the club.

All *So What Did You Expects* published in 1982 issues will be considered. First prize will be $100 cash and, if a member, a bonus of $100 credit towards A.P.P.L.E. software or publications. Programs by A.P.P.L.E. employees or directors will be judged, but prizes will be awarded instead to the next non-employee/director winner. All applications for judging and all submissions for the contest should be directed to the editorial office as listed on page 2.

Get your thinking caps on and come up with a new way to do something. It need not be practical, but it must be unique, and as long as it serves to put our readers brains in gear and force them to think of alternative strategies, it will be considered.

```
]LIST

5  REM

So What Did You Expect Dept

Paul Sandorff/Val J Golding

     Call -A.P.P.L.E.

10  HOME : SOWHT$ = "": PL =  PEEK
    (175) - 27: PH =  PEEK (176)
15 VL =  PEEK (105) + 2: VH = 256 *
    PEEK (106) + VL: POKE VH,26
    : POKE VH + 1,PL: POKE VH +
    2,PH
20  FOR I = 2 TO 36 STEP 2
30 X% = (8 + 12 *  SIN (I / 10))
40  VTAB X%: HTAB I / 2: PRINT SO
    WHT$
50  FOR PAUSE = 1 TO  INT (100 /
    I): NEXT PAUSE
60  VTAB X%: HTAB 1: CALL  - 868
70  NEXT I
80  POKE 37,20
90  GOTO 20
100  REM SO WHAT DID YOU EXPECT?
```

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Hardware Requirements: APPLE II PLUS (48K), DOS 3.3
Dual Disk Drives, Printer

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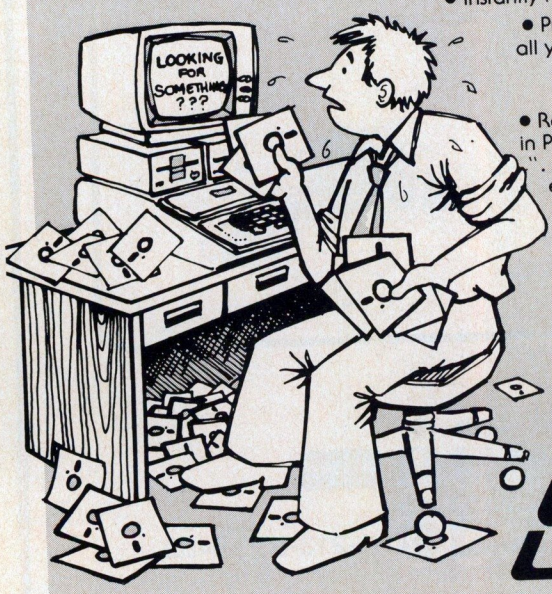

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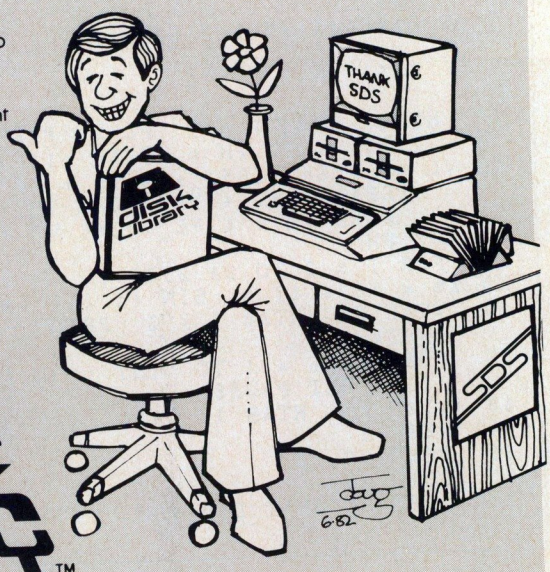

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TOMORROW'S APPLES TODAY

Kevin O. Donohoe/Editor

VERSAFORM ANNOUNCED FOR APPLE III

Applied Software Technology, an independent software vendor providing microcomputer programs for business and professional applications, announced today it's Apple III version of the VersaForm Business Form Processor. This new version, which supports the Apple III ProFile and Corvus Hard Disk Subsystems, joins the already popular Apple II version of VersaForm.

VersaForm, generically identified as a Business Form Processor, is a powerful and flexible set of user-friendly procedures which allow a non-programmer to set-up business forms on the Apple computer, to store them as files, and to generate analyses and management reports from their data. A rich set of automatic filing, data entry checking, and calculation options may be chosen to enhance accuracy and speed input. A data base reporting system produces detail summaries of any data items contained within a file of forms.

A unique feature of VersaForm, one that bridges the traditional gap between old paper-based business forms and new video-based forms, is an ability to format printed output to match a pre-printed form as though it were manually typewritten. Thus, a first-time user can get full value from an automated business system without having to incur the cost of the designing of new paper forms. Furthermore, the user can enjoy the familarity of accepted business forms, yet achieve the economies and efficiencies available through modern micro-data processing.

Common applications of VersaForm include invoicing/accounts receivable, purchase order generation/operations management; professional time and billing; estimating/job costing, and personnel records/benefit accrual reporting.

The hard disk versions of VersaForm, which now include both Apple II and Apple III, allow file sizes of up to 4 Mbytes. This ability to create large files without tedious and complex "volume swapping" has been requested by a large number of users of many Apple II programs with hard disk subsystems running Apple DOS 3.X. VersaForm may be installed on Apple systems using ProFile, Corvus, and other hard disks supporting the Pascal operating system.

VersaForm Apple III versions share all the important user interface features of the Apple II versions, insuring that user migration from an Apple II to an Apple III is a snap. Both Apple II and Apple III versions share the ability to have 80-column screen formats, allowing both systems to have identical "forms" on the screen. Not only are the Apple II and III 80-column screens identical, so is the user interface, command structure, reporting procedures, and file maintenance. Data disks may be interchanged between Apple II and Apple II systems, allowing users to add Apple III's to their existing Apple II networks without having to cope with data incompatibilities and conversions. Price: $495.00. Applied Software Technology, 14125 Capri Drive, Los Gatos, CA 95030, (408) 370-2662.

"THE PROGRAMMER"

Advanced Operating Systems has begun issuing "The Programmer", a program generator for the IBM and Apple II personal computers.

Through a series of menus the user can define what functions he wants his program to perform. "The Programmer" uses these selections to write lines of BASIC code which execute those specific functions. The end result is a program stored on disk which can also be copied onto other disks.

Among its countless other uses, "The Programmer" can be used to develop a mailing list, generate graphics or, with the IBM version, create music. With "The Programmer" programs can be chained, the user can write to any RAM address, or create sort routines with minimal effort. Branching, whether on error, specified keystroke, menu selection or a time delay is handled by single menu selection.

"The Programmer" is available for the IBM personal computer with 64K RAM, Monochrome Display, Monochrome Display/Printer Card, 2 disk drives and IBM DOS with Advanced BASIC.

The Apple version requires an Apple II with Microsoft Z80 card, 80 Column Card, and 48K RAM. Scheduled to be released soon is the Apple II version with Applesoft or Apple II Plus.

Price: $495.00 through computer retail outlets. "The Programmer" 200 page documentation is available for $29.95. Advanced Operating Systems, 450 St. John Road, Michigan City, IN 46360.

BIBLE NOW AVAILABLE ON FLOPPY DISKS

Bible Research Systems (BRS) of Austin, Texas recently unveiled its first product: "THE WORD processor" which contains the entire King James version of the Bible on floppy disks. Designed for students of theology, pastors, and the personal computer market in general, THE WORD processor consists of eight floppy disks replete with an easy-to-use instruction manual. According to BRS, the package is currently operable on Apple computers and will soon be available for the TRS-80.

Incorporating text processing and data management software with micro-processor technology, THE WORD processor is a unique achievement in that it makes a 4.5 megabyte data base (the Bible text) accessible by floppy-based personal computers such as the Apple. Because the Bible text is accompanied by a special word processing program, the small computer can scan the text, looking for any combination of words or phrases, and inform the user where and how often the word or phrase occurs. The user can scroll through the text at any speed he chooses and branch to specific verses of interest. Any verses or references of special interest can be printed on request.

THE WORD processor allows the user to keep libraries of indexes containing references to all verses relevant to a specific topical study or word search. These indexes to the Bible text provide a permanent file of resource materials. Future studies by the user can refer back to existing indexes for comparison of verses or expansion to a broader scope of study. These indexes are created dynamically by THE WORD processor and can be modified by the user. Each user's library of Bible study resources will grow as he invests hours of personal study.

THE WORD processor is priced at $159.95 (plus $2.50 for postage and handling) and is available directly from Bible Research Systems at 8804 Wildridge Drive, Austin, Texas 78759.

TOMORROW'S APPLES TODAY

THE AUTOMANIAC SYSTEM

The AUTOMANIAC SYSTEM comes complete with two sub-systems. When the AUTOMANIAC SYSTEM is used with the EXECUMANIAC SYSTEM, and the GSW INTROL PROGRAM, you Apple will run itself! At last, a computer that works for you!

The AUTOMANIAC SYSTEM continually checks the time and date from an onboard clock. When the pre-programmed time arrives, the AUTOMANIAC SYSTEM will execute either a program or a series of commands that you have scheduled. You can run programs that require keyboard input, and this keyboard input will come from special command list you have created with the EXECUMANIAC SYSTEM. With the GSW INTROL PROGRAM and a Mountain Hardware Introl/X-10™ controller card, you can control electrical devices in the Apple's environment on a scheduled basis.

If you are going to be a serious user of your Apple and still maintain a large data base of information, then you need a lot of computing time. THE AUTOMANIAC SYSTEM can increae you Apple's computing power by running 24 hours a day!

During the night on Mondays, Wednesdays, and Fridays, you can schedule the program that sorts your accounts receivable data. On the 15th of every month you can schedule a series of programs that will turn your printer on at 7:00 P.M., print out the bills at 7:05 P.M., and after all the printing is finished, the printer is turned off. During the day your computer won't be bogged down doing file maintenance, but instead will be free to access all that valuable information.

The AUTOMANIAC SYSTEM comes packaged with GSW notebook, a 34-page easy-to-use operating manual, and a 3.3 D.O.S. diskette.

Price: $100.00. The disk can be copied for backup. It runs on hard disk systems. The AUTOMANIAC SYSTEM requires: 32K or 48K Apple II Plus, 3.3 D.O.S., 80 col. printer (optional), Mountain Hardware Introl/X-10 card (optional).

The AUTOMANIAC SYSTEM is compatible with any one of the following clocks: Applied Engineering Time II Clock™, CCS Calendar Clock™, Computime Compuwatch™, Superclock II™, Mountain Hardware Apple Clock™, Mountain Hardware CPS Card™, Thunderware Thunderclock™, and Prometheus Versacard™.

The Geegery Software Works, P.O. Box 8028, Des Moines, Iowa 50301.

THE LOGO and EDUCATIONAL COMPUTING JOURNAL

A major new publication, *The LOGO and EDUCATIONAL COMPUTING JOURNAL,* has been announced by the Interactive Education Foundation, a non-profit research organization in Stony Brook, New York.

The L&ECJ is aimed at teachers currently using microcomputers in the classroom, professional educators engaged in creating and using educational software and both parents and children seriously committed to the use of educational computer products in the home.

The editors of The L&ECJ are Prof. Ludwig Braun, (Suny at Stony Brook) and Prof. Joseph Raben, (Queens College, Cuny).

Special editorial attention will be devoted to reporting classroom experience with all versions of the Logo Language and the latest instructional software.

LOGO and EDUCATIONAL COMPUTING JOURNAL invites all educators and computer professionals to report research and findings. The L&ECJ will serve as a forum for debate on the newest methods in computer assisted instruction.

Charter subscriptions are available for $20.00 a year. *LOGO and EDUCATIONAL COMPUTER JOURNAL,* suite 219, 1320 Stony Brook Road, Stony Brook, New York 11790.

HARDWARE:

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The new Microprism dot-matrix printer from Integral Data Systems, Inc. offers print quality approaching that of a daisy-wheel printer at a lower price than has previously been available. It is positioned to fill a need in the marketplace for higher quality output without extra printer features.

Standard Microprism printer features: Dotplot™ graphics, serial RS232 and Centronics-compatible parallel interface, automatic line buffering with 1400 bytes standard, 75 cps in correspondence-quality and 110 cps in high-speed data mode, plus MAISEY and many more of Integral Data Systems' innovations and standard in the Microprism printer.

Integral Data Systems, Inc., with more than 60,000 printers shipped worldwide since its founding in 1977. Integral Data Systems is an innovative leader in the dot-matrix printer industry. It has successfully met the requirements of a wide range of end-users and OEM applications including commercial, scientific and professional workstation uses. For more information on the Microprism Printer and Maisey printing techniques, contact Integral Data Systems, Inc., Milford, NH 03055. (603) 673-9100, (800) 258-1386, Telex: 953032. Price: $799.00.

SLOT SWAPPERS

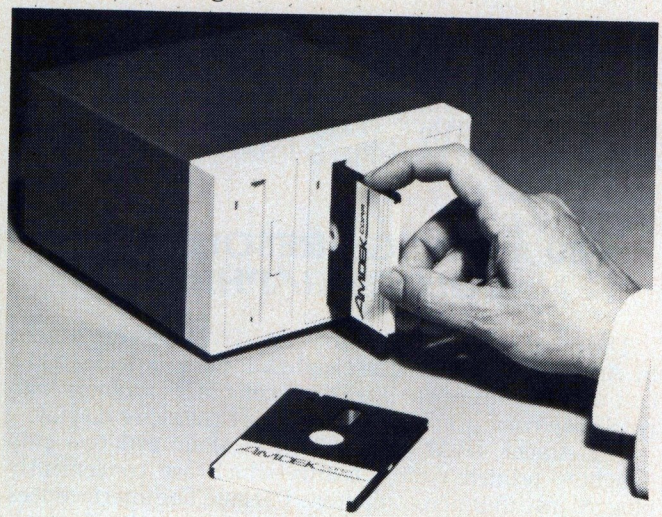
Interchange disk controller cards or printer cards with the flip of a switch. No special software required, no wiring — just plugs in, easy access to switches, installs in minutes, and no clips needed.

Your SLOT SWAPPER switch gets you around the problem of trying to run software that will only work from a floppy drive with a controller card in slot #6 when you must have something other than a floppy in that slot (such as a Corvus interface card). Many commercial programs have copy protection schemes that only let them work from slot #6. These include several accounting packages, copy programs and disk utilities. The Apple BASICS diskette will only work from a floppy in slot #6. To run programs like these you would have to physically remove both cards then put them back in opposite slots. Doing this often enough will soon damage those slots. Worse than that, if just once you forget to power off the Apple when you're swapping cards, you can burn out chips on those cards and on others as well as the Apple motherboard. With SLOT SWAPPERS installed, you just flip the switches and slot #6 can be any slot you choose (except slot #0). The standard slots the SLOT SWAPPERS will swap are 6 & 7, assuming a floppy in #7 and a Corvus in #6, although SLOT SWAPPERS can be ordered for any other 2 slots.

Price: $79.95. Johnson Associates, Inc., 6525 W. Villa Theresa, Glendale, AZ 85308, (602) 979-4554.

3 INCH MICRO-FLOPPYDISK DRIVE AND CARTRIDGE SYSTEM

The new Amdek Micro-Floppydisk daul-disk drive, just introduced by Amdek Corporation, Arlington Heights, Illinois, offers 1 Megabyte capacity and is plug compatible with standard 5 inch floppydisk drives. The new drive has a built-in power supply and accomodates two new 3 inch Micro-Floppydisk cartridges.



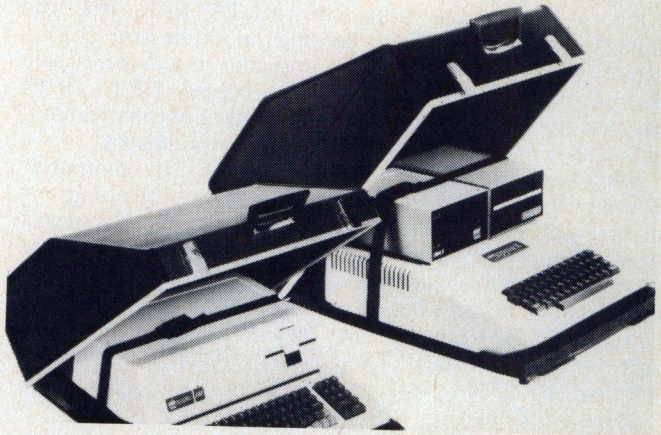
Only .179" x 3.15" x 3.94", the new Micro-Floppydisk cartridge features a flip-type, hinged head cover that protects the 3 inch disk from dust, scratches or fingerprints. The hinged cover automatically flips open when inserted in the drive unit.

The single-side recording capacity is 125 K Bytes or 250 K Bytes for both sides with double-density (500 K Byte) capability. A "write protect" mechanism is available to assure "read only" status for data recorded on the Micro-Floppydisk. The sturdy cartridge also provides amply room for magnetic-sheet or bar-coded indicia for automatic retrieval from large volume stock shelves.

Price: $899.00. Amdek Corporation, Marketing Dept., 2420 E. Oakton St., Suite E, Arlington Heights, IL 60005. Phone: (312) 364-1180, TLX 25-4786.

APPLE III CARRYING CASE

The growing family of fiberbilt computer cases has just received a new addition.....The Apple III carrying case. Like it's brother, the Apple II case, the Apple III case features a foam padded cover and base, a removable locking cover that allows for cables to exit the case with the cover closed and locked, non-metalic hold down strap, rubber no-slip bumpers, sturdy ABS plastic end-cap construction and is stocked in brown.



The Apple III case is available for $100.00 and the Apple II case for $64.00 (UPS delivery included for both cases) from FIBERBILT, 601 West 26th Street, New York, NY 10001-1199.

16 TRACK RECORDER FOR THE ALPHASYNTAURI DIGITAL SYNTHESIZER

Syntauri Corporation announces METATRAK™, a 16-track digital synthesizer recording system which goes beyond conventional recording methods. Now, at an affordable price musicians, composers and synthesists have the power, flexibility and control of an all-digital synthesizer/recorder. Syntauri even offers a 17th track: the METATRAK recording system uses the alphaSyntauri™ keyboard, which is alway live and separately controlled.

METATRAK is available only for the STUDIO PRO five octave alphaSyntauri synthesizer, a fully programmable 8-voice synthesizer with a velocity sensing keyboard, user-definable keyboard splits and banks of 10 immediately available preset sounds. To record, a musician simply plays the Syntauri keyboard: all notes played are exactly captured on each of the sixteen tracks for storage and later recall and playback.

METATRAK expands a musician/composer's horizons with a combination of features unique to the Syntauri system, including: (1) standard multi-track recording features. Pre-track Playback, Record, Erase and Volume controls let you operate and record with METATRAK just as you would a conventional tape deck. (2) a powerful sequencer. From one to all 16 tracks can be sequenced together for repeating bass lines or background rhythm patterns. (3) independent per track control over volume, instrument, and vibrato on/off. Expansion possibilities for additional per-track timbre controls are built into METATRAK. (4) a built-in click track. METATRAK's standard metronome, from one to 280 beats/min during both play and record, also provides multiple outputs — audio, visual, and control line.

TOMORROW'S APPLES TODAY

For a composer/arranger, the alphaSyntauri keyboard synthesizer with METATRAK is a very flexible, easy to use scratchpad for trying out new musical ideas, saving patches, and refining pieces prior to final recording. Orchestrating is quickly accomplished — all the instruments may be re-defined per track, and custom timbres designed using the Syntauri sounds creation software.

For a performing musician, METATRAK lets the alphaSyntauri synthesizer become an orchestral accompanist for on-stage as well as in-studio use. Now, a solo performer can team up with pre-recorded METATRAK patches, the live Syntauri keyboard, another live instrument, plus a rhythm unit and become an entire orchestra.

Why does the alphaSyntauri synthesizer use a computer? Syntauri designes synthesizers to be modular, fully programmable, and expandable. With its built-in general purpose Apple II micorcomputer system, the alphaSyntauri synthesizer provides musicians the same programmability options enjoyed by Syntauri's designers. Most important, a musician can keep at the state-of-the-art because upgrades and added features (such as METATRAK) are available in software at nominal cost.

Price $1995.00.

CHIPS OFF THE 6502

Some interesting developments in the 650x series of microprocessors have been uncovered for us by Roger Knights. The CMOS 65C02, with a maximum clock speed of 2Mhz is currently being debugged. Most notable difference is the repair of the JMP (xxFF) bug (see *Call –A.P.P.L.E.,* May, 1982). No new instructions have been added, but all "illegal" opcodes have been NOPed and instruction decoding is by microcode, taking the same number of cycles as the 6502.

A 16–bit chip of new design is scheduled for release within the next year; an emulation mode will enable it to run current 6502 programs. No decision has yet been made whether this product will be released as a high–cost, high performance version, or as a less expensive and more modest one. This, coupled with the uncertain release date is largely a result of the preoccupation of the parent company (Commodore) with other new products. The chip may be second–sourced by Rockwell. In addition, CMOS versions of the Rockwell 6500/xx series of single-chip microcomputers are expected to be announced at any time.

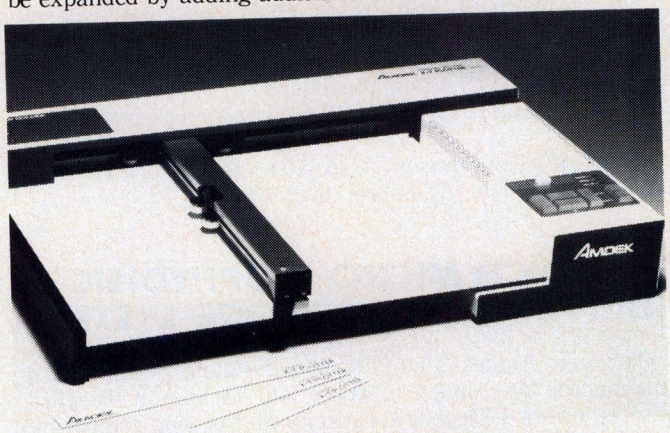
The R65C02, a CMOS 6502, will be offered with four different clock rates, ranging up to 4Mhz, with the possibility of 5 or 6Mhz being available later. The R65C102 is a variant version meant for new designs. It has the disadvantage of minor pin incompatibilities and the advantage of greatly reducing systems costs by operating at 4Mhz with far slower (and less expensive) memory chips. Both will either be officially second-sourced or supplied as functionally identical products by MOS Technology.

The R65C02/102 chips add 59 new opcodes. Of these, 14 are new addressing modes for existing mnemonics, including indirect (absolute) for ORA, AND, EOR, ADC, STA, LDA, CMP and SBC, and two implied (accumulator) modes for INC and DEC. Brand new instructions include a BRanch Always, push and pull for the X and Y index registers, four modes of STore Zero and numerous modes of testing and branching on bits or bytes set or clear.

A fuller treatment of the instruction sets, along with an opcode map will appear in a future *Call –A.P.P.L.E.*

ECONOMICAL X-Y FOUR-COLOR PLOTTER FROM AMDEK

A new, low cost Model DXY four-color Plotter designed for use with personal or business computers has just been introduced by Amdek Corporation, Arlington Height, Illinois. The Model DXY Plotter has a 10″x14″ effective plotting range and figures may be easily drawn using the "Control Command" or "Basic Command". The Plotter's functions may be expanded by adding additional ROM.



Maximum plotting speed is 2.73″ per second and step size is .003″/step. A Centronics interface is furnished to permit easy connection to a computer.

The Model DXY is furnished complete with 4 pens, pen holders and chart hold-downs. Price is $949.00. It is available for October 1, 1982 delivery.

For further information, write or call: Amdek Corp., Marketing Dept., 2420 E. Oakton Street, Suite E, Arlington Heights, IL 60005. Phone: (312) 364-1180.

80 x 24 HIGH RESOLUTION COLOR GRAPHICS

The new Digital-Video-Multiplexor (DVM) just introduced by Amdek Corp., Arlington Heights, Illinois, provides a low cost interface for Apple II personal computers to obtain high resolution color graphics and a 80 x 24 character display.

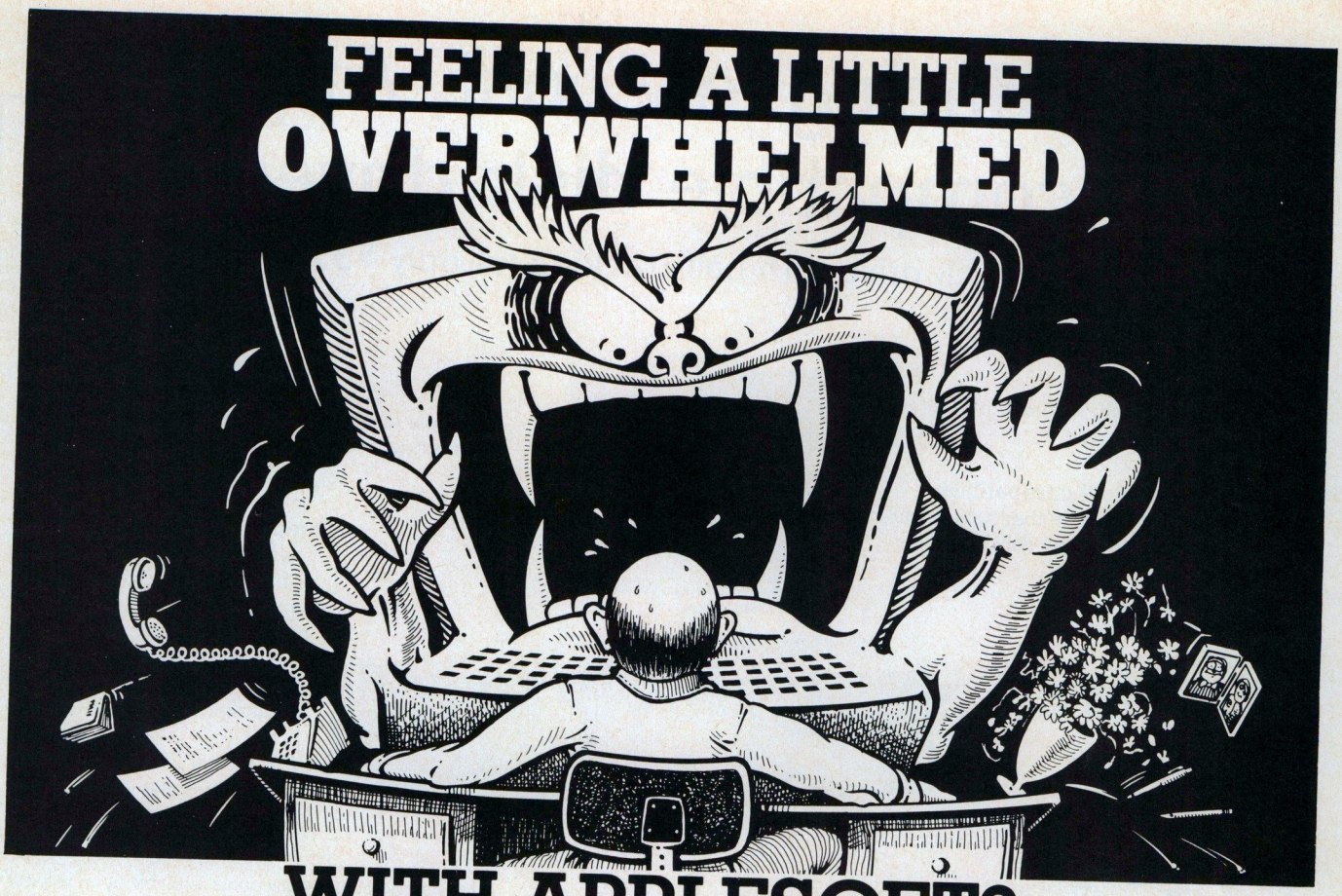
The Amdek DVM consists of two, four and two chip daughter printed circuit boards which are conveniently plugged into the microcomputer's I/O bus. The interface does not interfere with the normal operation of the Apple II computer, nor does it affect its software compatability.

The Amdek DVM is software programmable to allow transparent operation and is parallel with existing Apple text and graphic modes. It's basically a 4-channel multiplexor. Three channels are to multiplex the existing Apple II text, low resolution and high resolution graphics. The 4th channel allows the use of an 80 character line video board.

The new DVM is also color channel software programmable. The three color channels can be turned on or off by software control. The DVM board may occupy any slot in the Apple II. It further features low power consumption and low power Schottky logic.

Price: $199. For further information on the Digital Video Multiplexor and Amdek's family of professional Video Monitors for microcomputer systems, contact: Amdek Corp., 2420 E. Oakton St., Suite E, Arlington Heights, Illinois 60005. Telephone: (312) 364-1180, TLX 25-4786.

FEELING A LITTLE OVERWHELMED



WITH APPLESOFT?

B.E.S.T. Our original Applesoft Optimizer (AOPT) has now been enhanced to bring to the Applesoft programmer the most comprehensive set of software tools available today—B.E.S.T. The BASIC ENHANCED SOFTWARE TOOLS is a machine language program to aid in writing, analyzing, and debugging Applesoft Basic programs. B.E.S.T. will certainly increase programmer efficiency for improved productivity. B.E.S.T. offers: 1) Variable Cross-Reference, 2) Line number Cross-Reference, 3) A Complete Cross-Reference, 4) Optimize variable names with recognition of both short (two character/ Applesoft standard) and long labels, 5) REM Optimizer—with an option to "protect" specified REM statements, 6) Line Optimizer to join short instruction lines of specified length, 7) Merging two programs, 8) Automatic line numbering, and 9) A powerful, yet easy to use Renumber function. Implementation of B.E.S.T. can reduce memory requirements by up to 50% and increase execution speed of Applesoft programs by up to 100%. B.E.S.T. is a low cost alternative to an Applesoft compiler.

B.E.S.T. requires a 48K Apple II/II+, Applesoft in ROM or Language card, and DOS 3.3..... **$40.00**

BUILD USING. Do you have trouble printing charts, reports, or formatting numbers on the screen? If you do, BUILD USING can solve your problems. BUILD USING is a powerful Applesoft utility which provides a "print-using" type routine for numbers and strings. By creating simple "formats", you tell BUILD USING how to format the output. The output from BUILD USING are strings which may be printed, written to disk, saved for later usage, or even reformatted. With BUILD USING, you can choose how many digits should be displayed to the left and right of the decimal point, and even fill the leading positions with the character of your choice. For example, you can print the number '157.23' and '157.2' or '000157.230', of '****$157. AND 23/100 DOLLARS', or hundreds or other ways (including exponential formats). Working with strings is just as easy. Also included are three levels of error trapping, so you can correct numbers that cannot fit into your specified format.

Utilities like BUILD USING are usually difficult to use because they must be located in one memory location (usually between DOS and the DOS file buffers), they cannot be used with your favorite editor or other special routines. BUILD USING does not have this limitation, as it can be easily located in many different memory locations: 1) the "standard" between DOS and DOS file buffers, 2) at HIMEM, 3) APPENDED to your Applesoft program, or 4) anywhere else in memory. Appending BUILD USING to your program is as simple as EXECing a TEXT file. BUILD USING uses the "CALL" command thereby leaving the ampersand vector free for your own use.

BUILD USING requires Applesoft in ROM (Language cards are fine), DOS 3.3 and a minimum of 32K... Only **$30.00**

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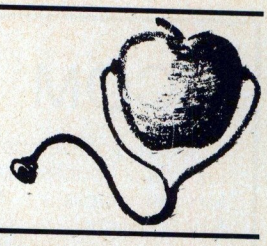

George Spelvin

INCOMPATIBILITY in peripherals is a problem that becomes increasingly evident. 80 column cards, printers, RAM cards, etc. As more and more products hit the market it becomes difficult to write software that will "work" with everything. This will be seen in the answer to the first question.

Question

I have a 48K Apple][Plus with an Integer ROM card in slot zero, and a Videx Videoterm card in slot 3. When I power up with the Integer card selected (switch up), I get a blank screen, no prompt, no cursor, nothing. If I turn the switch off, everything works fine, and I boot up to Applesoft. I have also tried another Integer Firmware card in my machine and the same thing happens. Can you provide any help?

Answer

Videx customer support to the rescue. Although you didn't mention it, you probably have the Videx Softswitch. If this is the case, when you power up, the Videoterm board is expecting to find an Autostart ROM, which turns you video display on. This is actually done with a toggle, or access to Annunciator 0 on the game paddle port.

The way I see it, you have about three choices. None of them are exactly the perfect solution, but any one will keep you from stumbling in the dark.

1) When you power up, you can type C058 and hit return. This will switch the state of the annunciator and enable video.
2) You can leave the switch on the Integer card in the down position; this will select the main board (Autostart) monitor.
3) You can replace the (old) monitor ROM on the Integer card with an Autostart ROM.

Question

I recently bought "What's Where in the Apple" from you, and it's a great source of information, but I can't find any expanation of the "\USE-TYPE\" code fields. Am I missing something?

Answer

No, you're not missing anything, the book is. I wondered about that one for a long time, too. I'm not real sure about the accuracy, but this should help. For the USE field:

S = Subroutine
P = Parameter
B = Buffer
H = Hardware

For the TYPE field:

E = Entry point
B = Block
# = length in bytes
L = Label
F = Flag

Question

After I've had my printer on, DOS seems to have gone bye-bye and I can't do any disk commands. Am I doing something wrong?

Answer

You're not alone. A lot of people have the same problem. It's probably because you haven't turned your printer on and/or off with a PRINT D$ "PR#1". If your program reads something like:

```
300  PR#0
```

This resets all the character input/output "hooks" and turns DOS off in the process. If you actually need to turn DOS off, then you can do a CALL 1002 to turn it back on. I hear Ralph Swerdlow is going to write someting on this in a little more detail.

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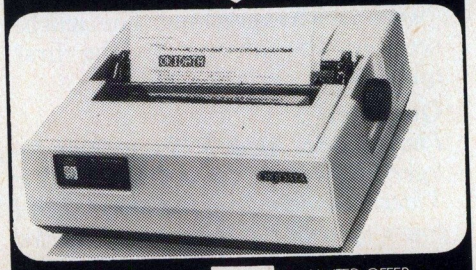

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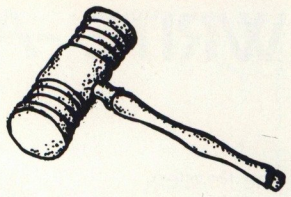


David A. Lingwood/Secretary

June 15, 1982
A.P.P.L.E. Offices, Renton

PRESIDENT Dick Hubert called the throng to order at 7:32PM. There were 62 members and guests present.

Old Business: none.

Committee Reports:

Mike Thyng reported on the Apple Festival at Seattle Center. There were at least 35 club member participants who demonstrated what Apples can do during the two days. There were an estimated 3,000 vistors.

New Business:

Mike Lane suggested a swap meet. After discussion it was decided to do this in August, at our regular meeting. We have an arrangement with Softalk to provide members with subscriptions to this magazine for $15 per year. The club is trying to stock fans for the Apple; these will list for $22.50 for the kit.

Dick Hubert announced our arrangement with The Source, through which members may purchase Source access for $75. We will set up a closed user group with its own menu, and recent *Call –A.P.P.L.E.;* programs will be kept online. We will also conduct an online Hotline. Dick also mentioned that we have a supply of CDC diskettes at $1.97 each.

The meeting was adjourned at 7:55PM.

Q&A

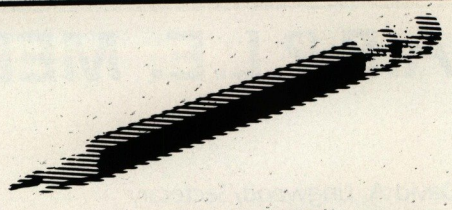
This popular, if frantic, feature fielded questions on communications, graphics, 80 column cards, etc. Noteworthy at the time, but nothing worldshaking.

Speaker

Dr. Allister Holden, Prof. of Electrical Engineering at the Univ. of Washington, discussed the progress and problems of voice recognition and synthesis. The goal is to speed computer I/O by use of more natural communication channels than human finger tips on a keyboard, or eyes glued to a CRT. Spoken output is difficult to produce, given the "prosodic" features of human intonation, yet output is easier than input. Chips exist which can give 99% reliability in understanding sounds and speakers to which they have been trained.

Recognition of continuous prose is a hot R&D area, even given the relative failures of early optimistic language translation, etc. projects. Strong syntactical checking is important for reliability. Factors affecting reliability and techniques for signal processing were also covered.

WRITE -A.P.P.L.E.



The Readers

Dear Val,

Leighton Paul's article "Vandal Foiler" in the February, 1982 *Call -A.P.P.L.E.*, uses a POKE 214,255 command to limit BASIC and DOS commands to the user. POKE 214,255 disables: LIST, NEW, insert a line, delete a line, POKEs, CALLs and the DOS command SAVE. The result of any of these commands (except SAVE) is to run the current program in memory. A SAVE command prints the error "PROGRAM TOO LARGE".

The following DOS commands still work: INIT, DELETE and RENAME. To foil the vandal, these comands can be given new names. Reboot a disk with standard DOS that you want to modify. Enter the monitor.

To change INIT to PROT enter:
A884: 50 52 4F D4
To disable the DELETE command, enter: A898: 58
To disable the RENAME command, enter: A8CC: 58
(DELETE becomes XELETE, RENAME becomes XENAME)

The "PROGRAM TOO LARGE" error encountered on a SAVE attempt can be changed to "UNABLE TO SAVE" by entering: AA1B: 55 4E 41 42 4C 45 20 54 4F 20 53 41 56 45 61 20 A0.

After the DOS changes have been made, SAVE the new DOS on a blank disk by typing PROT (formerly INIT) with the following as a suggested HELLO program. *Caution: do not run HELLO before initializing the disk.*

```
10 D$ = CHR$(4)
20 POKE 214,255
30 PRINT D$;"CATALOG"
```

If Disk Zap is available, other disks may be updated without transferring files by reading track 1, sector 7 and track 1, sector 9 of a Vandal Foiler disk and writing them onto the new disk. HELLO program names must remain the same and POKE 214,255 must be in the HELLO program.

Whenever the Vandal Foiler DOS is in the computer, even reboots of that disk will not allow a user to initialize, delete or make other changes.

Dan Yeager
3154 South 10th East
Salt Lake City, UT 84106

Dear Val,

Unfortunately, our industry seems to be a seller's market — almost anyone can set up a small business, and stay afloat long enough to lure several of us (often more than a few!) into sending money to order a product "mail-order." All of us have heard what can happen to that money — it might disappear entirely, or, at best, take weeks or months before the product is received. Service, support, and quality seem to be words (and concepts) forgotten by altogether too many of the companies we do business with.

Because of this dim record, I almost always buy from a local dealer, whom I can deal with "face to face" if I have any questions or problems. Recently, though, I departed from this rule of thumb to purchase ribbon cartridge refills for my Epson MX-80 printer. As the company that I ordered from, Data Systems, Box 99, Fern Park, Florida, 32730, is about as far away from my Washington state address as you can get within the U.S., I expected a long wait for crisp, dark listings. Amazingly, I received my order eight days after I mailed it! This company is truly a gem — if only the larger companies would follow their example! Not only are they incredibly fast, but I can buy six refills for the price of one new cartridge here in the Seattle area.

I will surely do business with Data Systems again, and heartily recommend them to anyone else contemplating "rolling their own" Epson ribbon refills. Good luck to you, Data Systems!

Terry Owen Permenter
702 2nd Ave. W. #104
Seattle, WA 98119

Dear Val,

I have found the text file reader, TREAD, on the A.P.P.L.E. Apfile disk extremely useful. Unfortunately often when I have been using it, it has been because one of my text files is messed up and I am in a hurry to inspect its contents. When TREAD demands that I remove the Apfile disk, insert into the same drive the disk on which the file in question resides, I am inconvenienced. It is a bother to a person in distress!

Solution: Have TREAD ask which drive the diskette is to be read in. Should be simple enough. It isn't, however, because the machine language subroutines appended to TREAD are referenced in line 10 to the beginning of the program. Therefore, any changes to the program will cause it to bomb. If, however, those routines are referenced to the end of the program, changes can be made to the program and it will still work properly. See the listing. Lines 10,18,30, and 193 are modified. Line 100 is added. I think this makes use of TREAD with a two-drive system much more convenient.

Stephen E. Bach
Rt. 2 Box
Scottsville, VA 24590

```
]LIST

10 RWTS =  PEEK (175) +  PEEK (17
    6) * 256 - 64:DPNT = RWTS +
    14:LPNT = RWTS + 31
18  HOME : PRINT : PRINT  SPC( 9)
    ;"** TEXT FILE READER **": PRINT
    : GOTO 100
30  PRINT D$;"OPEN ";NM$",D"DR
100  PRINT : PRINT : INPUT "ENTER
     DRIVE # ) ";DR: IF DR (  )
    1 AND DR (  ) 2 THEN  VTAB  PEEK
    (37): CALL 65338: CALL  - 86
    8:VTAB PEEK (37) - 1: GOTO
    100
193  GOSUB 28: VTAB (24): PRINT "
    READ ANOTHER FILE?";: POKE  -
    16368,0: GET G$: PRINT : IF
    G$ = "Y" THEN  HOME : GOTO 1
    00
```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Dear Clardy & Killion,

I suggest you use a JSR $D683 (STKINI –clear stack) in your On Reset GOTO program from *Call –A.P.P.L.E., in Depth 1.* This seems to correct the memory full error that otherwise occurs and also does not seem to cause a problem with a GET statement.

Robert Neuhauser
31581 Lamar Drive
Farmington, MI 48024

```
0300: 20 EA 03    JSR  $03EA
0303: 20 FB DA    JSR  $DAFB
0306: 20 83 D6    JSR  $D683
0309: A9 00       LDA  #$00
030B: 85 51       STA  $51
030D: A9 64       LDA  #$64
030F: 85 50       STA  $50
0311: 20 41 D9    JSR  $D941
0314: 4C D2 D7    JMP  $D7D2
```

Dear Val,

After entering Dice 82, in *Call –A.P.P.L.E.,* April 1982, I found it worked very well except for one small annoyance.

Several of the programs that I wanted to use it with employ the escape key for various functions. As the escape key is used as a shift key or shift lock in Dice 82, it wasn't available for use by me in any of my programs.

A call to Dan Paymar resolved the problem and I thought others might benefit from his solution.

1. **Boot system**
2. **Insert Dice 82 disk and type UNLOCK DICE2 (c/r)**
3. **BLOAD DICE2 (c/r)**
4. **CALL -151 (c/r)**
5. **37B5: A9 9B 60 (c/r)**
6. **3D0G or CTRL-C (c/r)**
7. **BSAVE DICE2,A$3500,L$387 (c/r)**

This completes the patch. Typing CONTROL F now is the same as typing ESCAPE.

Dennis King
352 Merrilee Place
Danville, CA 94526

Dear Val,

Many thanks for selecting my article "HexaDecaColor Double Bubble Sort" as the 1st prize winner in Tom Crawford's "So What Did You Expect?" contest! I have gotten many nice comments and compliments since it appeared in the March issue. It was quite an honor, and I truly appreciate it.

Upon proofing the article against my original manuscript, I discovered a small but significant error of omission which might have confused some of your readers. In the second paragraph on page 54, the last sentence was printed as:

> "Change the plotting color again, this time to the former color of the block below me, which we saved as "G" (Line 360), and THEN step onto the block below (Line 370)."

In the original, this single sentence was really *two* sentences, part of which was left out. The original read:

> "Change the plotting color again, this time to the former color of the block below me, which we saved as "G" *(Line 350). Now plot the block I'm standing on in the color "G" (Line 360),* and THEN step onto the block below (Line 370)."

I have italicized the portion that was omitted. As you will appreciate, it is this omitted part that completes the "exchange" portion of the sort. Small matter, but it might confuse some of your readers.

Scott Simpson
905 Applewood Road
Fort Wayne, IN 46825

Dear Val:

"Computer crime" is becoming a common term, but we have recently been victims of a rather unusual form of it. A remarkably sophisticated and specialized burglar broke into our house; to the great surprise of the police, the only thing he took was the 128K Saturn RAM board which I had recently installed in my Apple II. Nothing else (except one unrelated diskette) was taken or disturbed. This is certainly a step beyond piracy of programs, although I suspect that people who try to achieve a reasonable income developing and selling programs might not agree.

I had been thinking of submitting a review of the RAM board to Call — A.P.P.L.E., and the thief seems to have given it a remarkably favorable review. During the brief time I had it, I too was quite impressed by the Saturn card, and I agree with the burglar that it was most valuable single thing in my Apple. Apparently the thief didn't recognize the value of the manual and diskettes; he failed to take any of them. Unless he is a remarkably sophisticated programmer, the card will be useless to him without these items — I find that fact somewhat consoling.

This leads to the point of this letter. I would be greatful if any readers of Call — A.P.P.L.E. who have Saturn cards would regard with great suspicion any requests to copy their diskettes or manuals, and let me have the name and address of anyone making such a request. Please call me at (315) 423-2510 or write to:

James R. Florini, Ph.D.
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Dept. of Biology
Syracuse University
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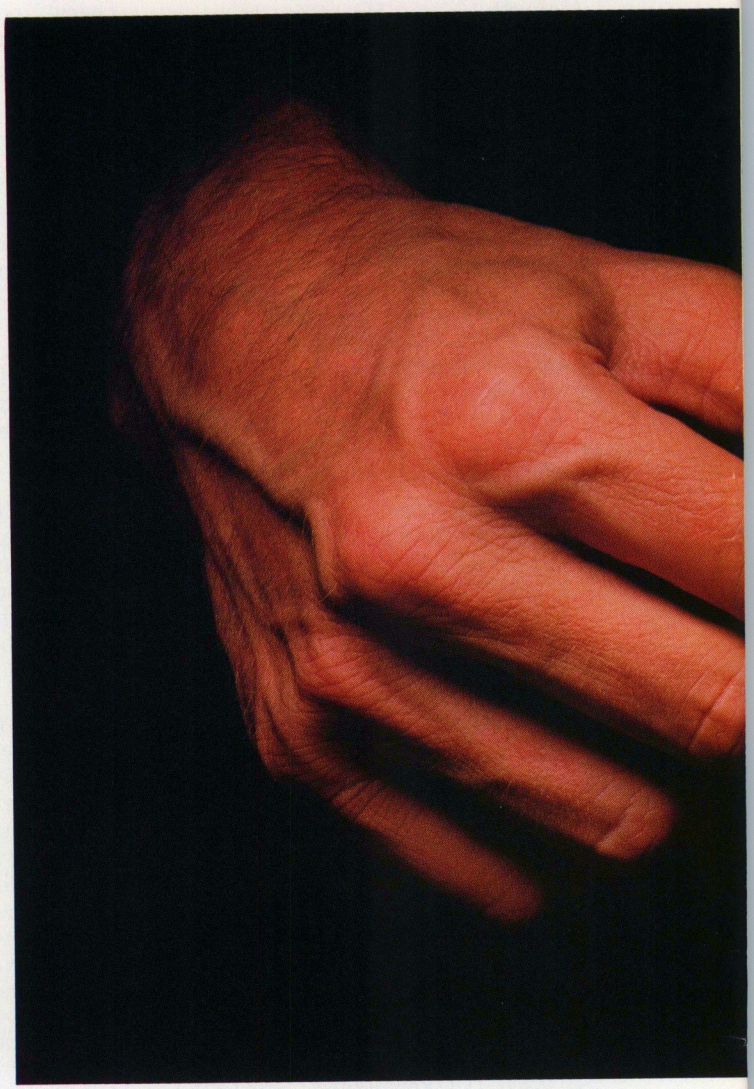

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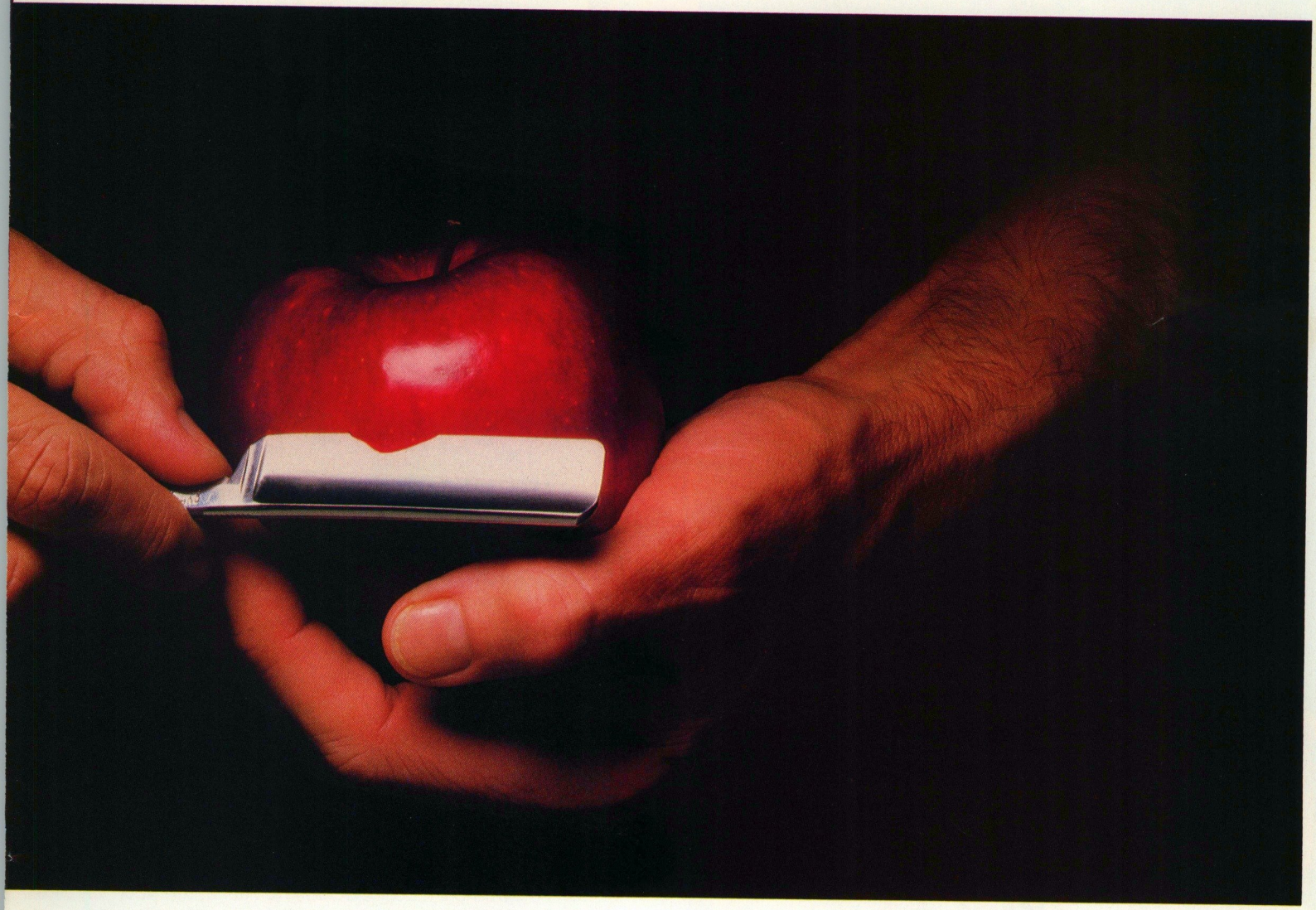

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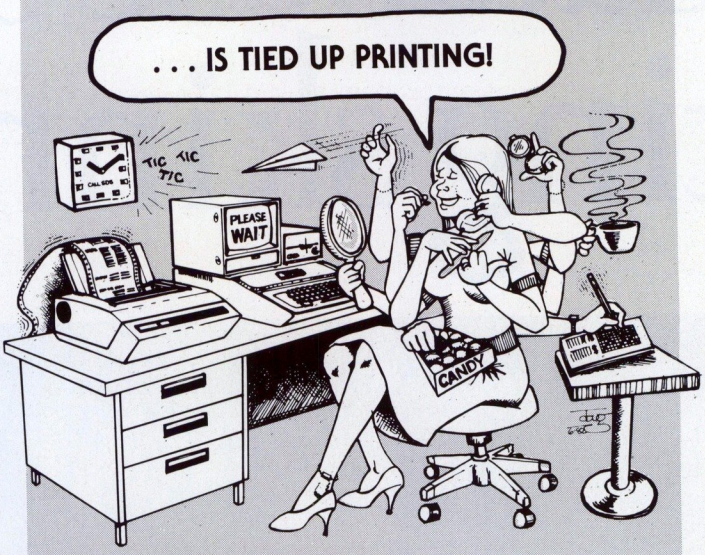

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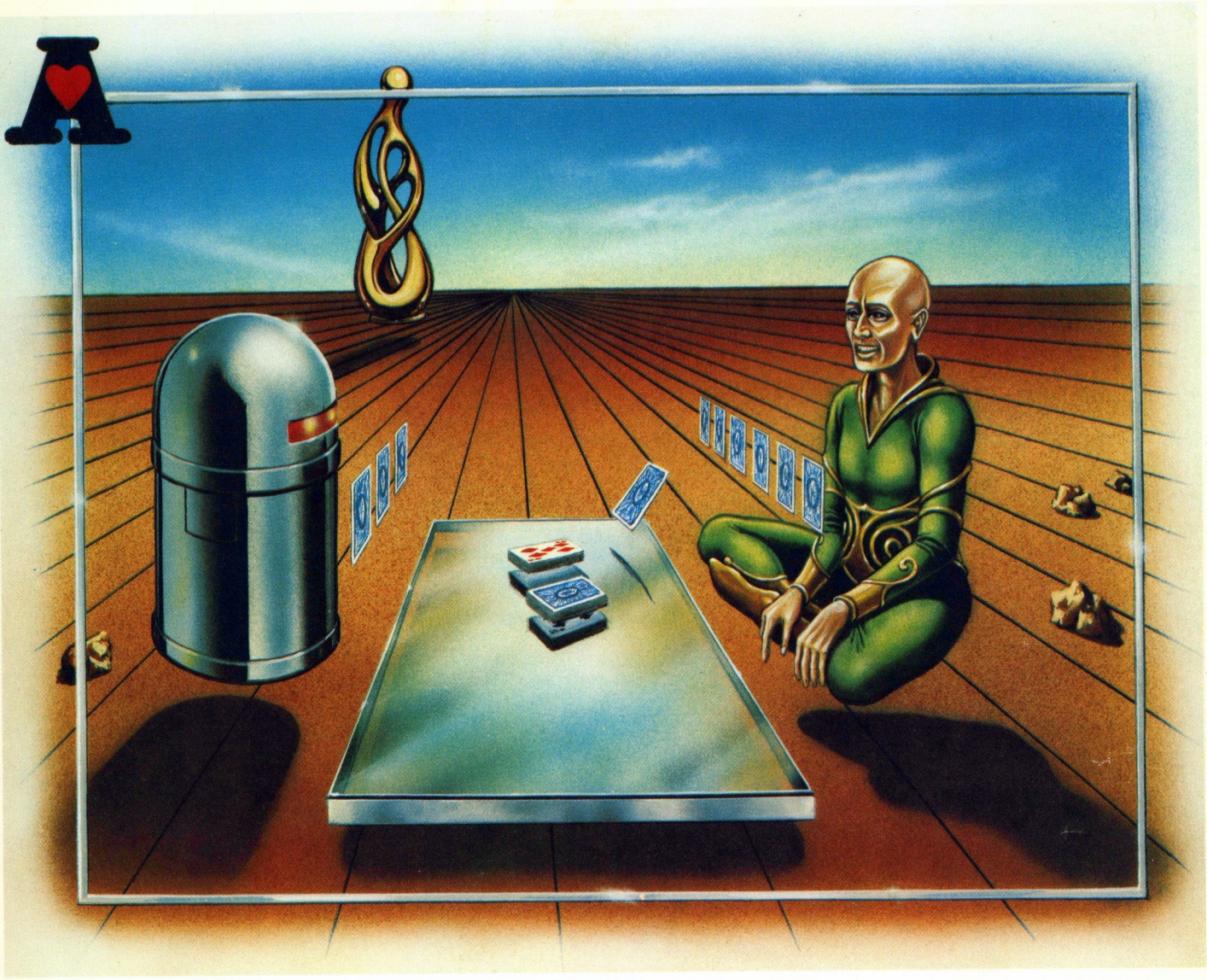

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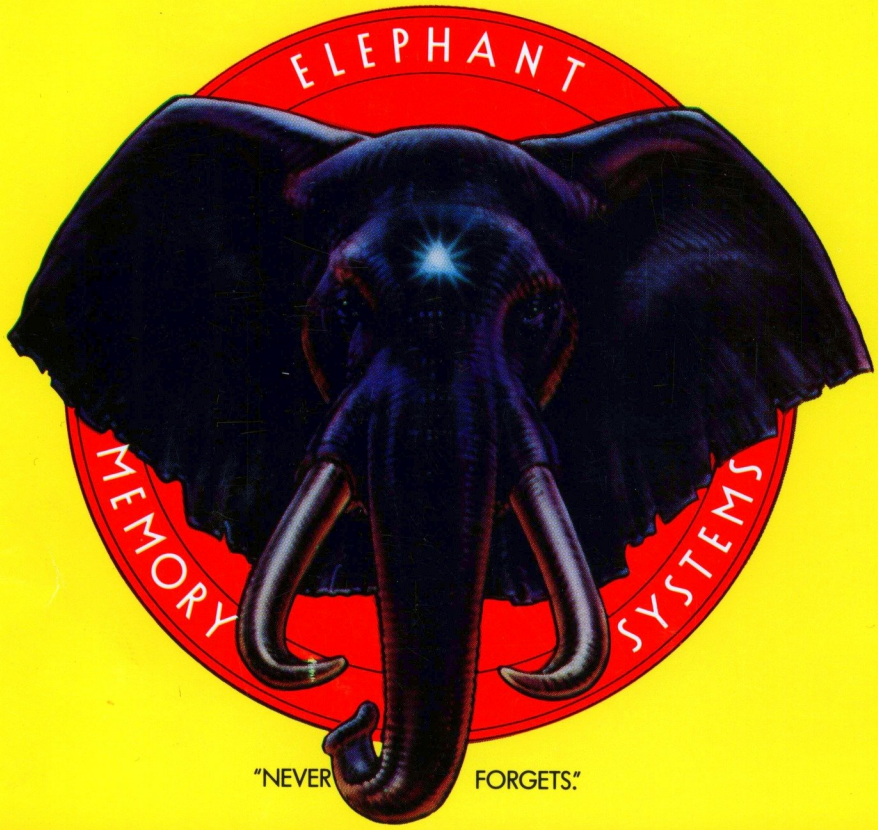

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